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AVIATION

The Oldest American Aeronautical Magazine

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THE *St. Louis Show*

STRIKING FEATURES OF THE *Exhibits*

THE WEEK'S *Aeronautical Meetings*

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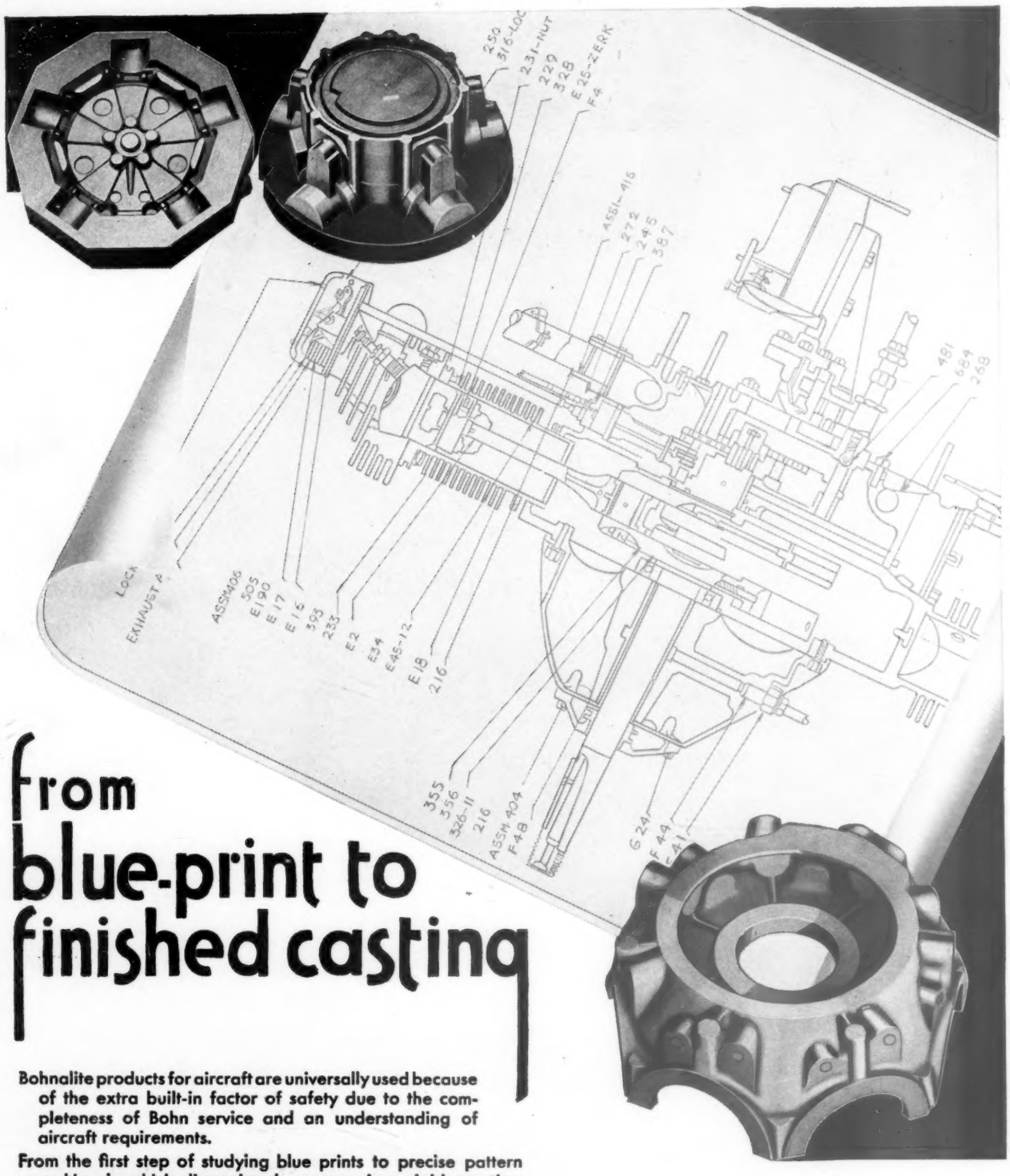

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AVIATION

The Oldest American Aeronautical Magazine

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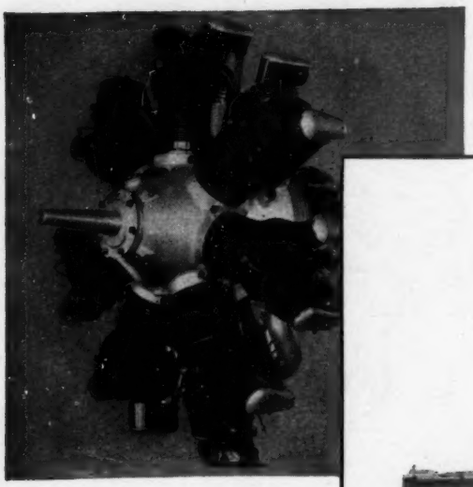
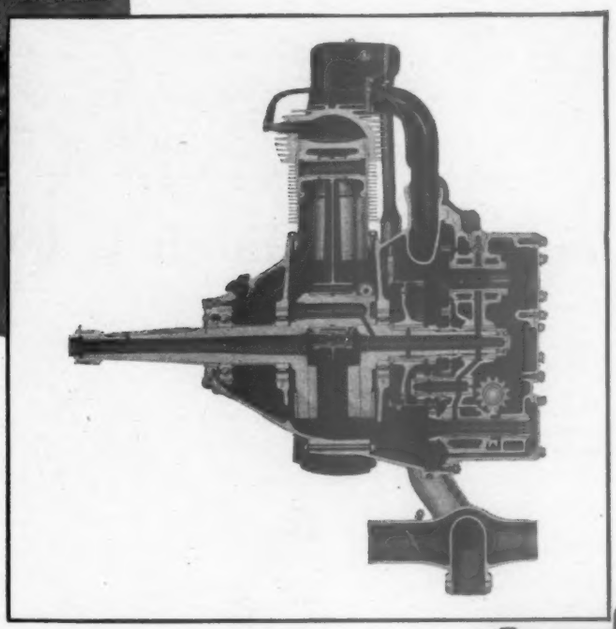


Continental 7-cylinder, radial, air-cooled airplane engine manufactured by CONTINENTAL AIRCRAFT ENGINE CO., *Detroit, Mich. Center illustration shows sectional engine view and lower right is Nickel Alloy Steel two-piece crankshaft.*



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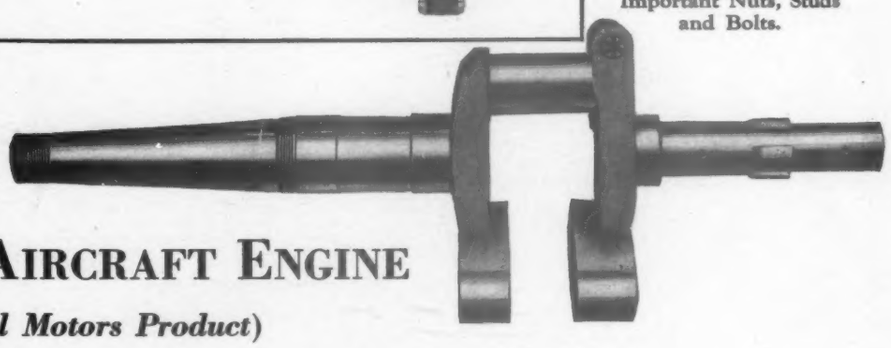

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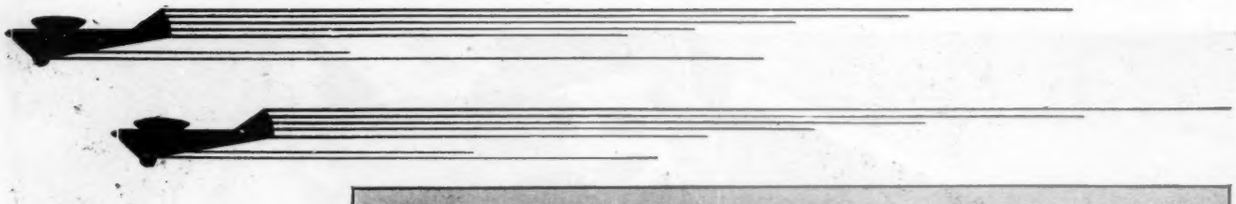
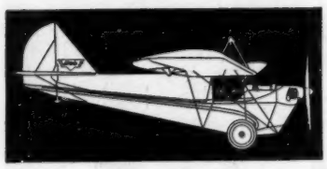
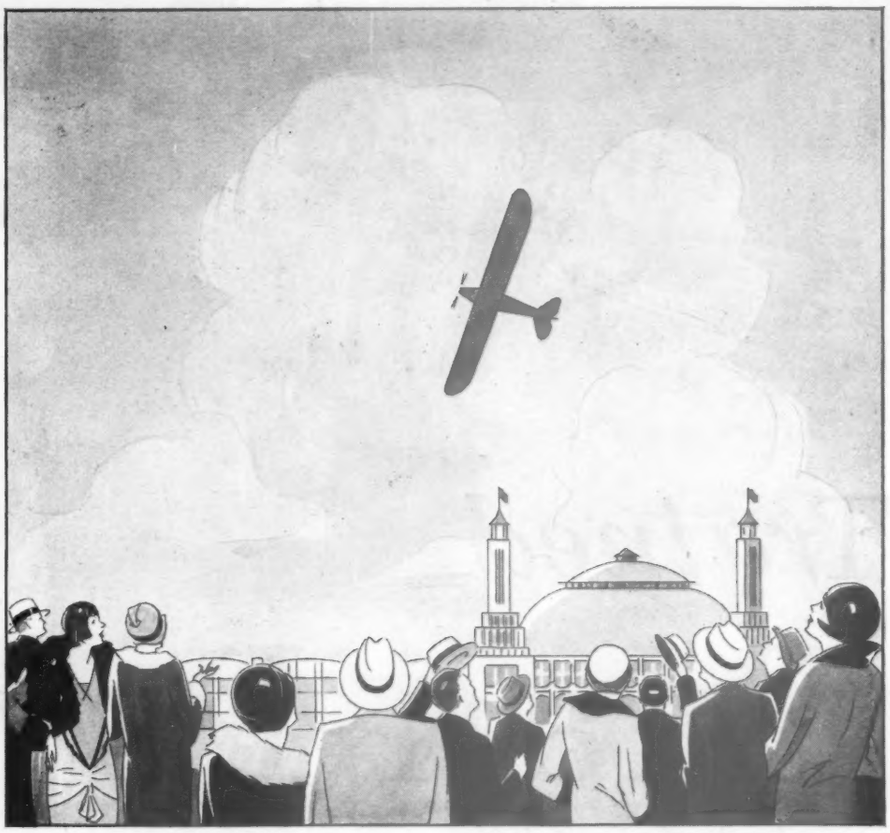




The Aeronca C-2 was designed by Jean A. Roché, Senior Aeronautical Engineer of the U.S. Army Air Corps, perfected by Robert A. Galloway, and is built under the direction of Conrad G. Dietz. Mass production has made it possible to manufacture this plane at a cost far lower than its rugged construction, its fine materials . . . its style, finish, performance and dependability would indicate. It is a value far in excess of any plane on the market today.



The Sensation of the St. Louis Show . .

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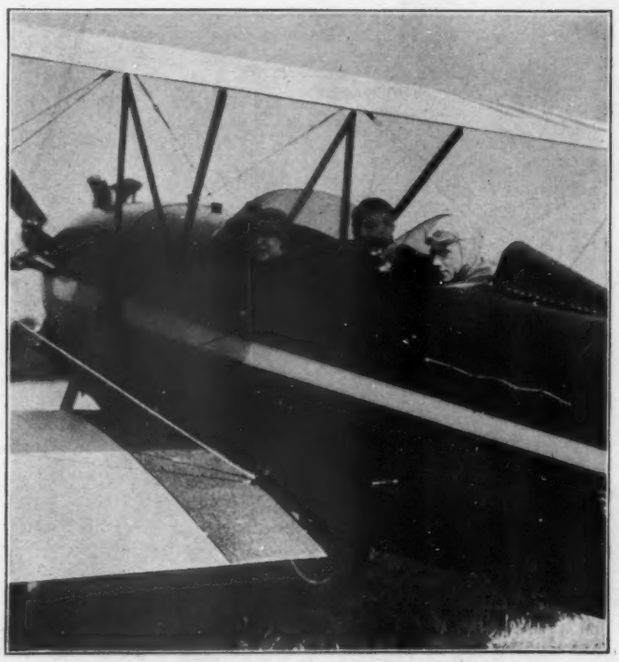

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Chord both wings	4 ft. 6 in.
Wing area	233.4 sq. ft.
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Useful load	768 lbs.
High speed	110 m. p. h.
Cruising speed	90 m. p. h.
Landing speed	38 m. p. h.
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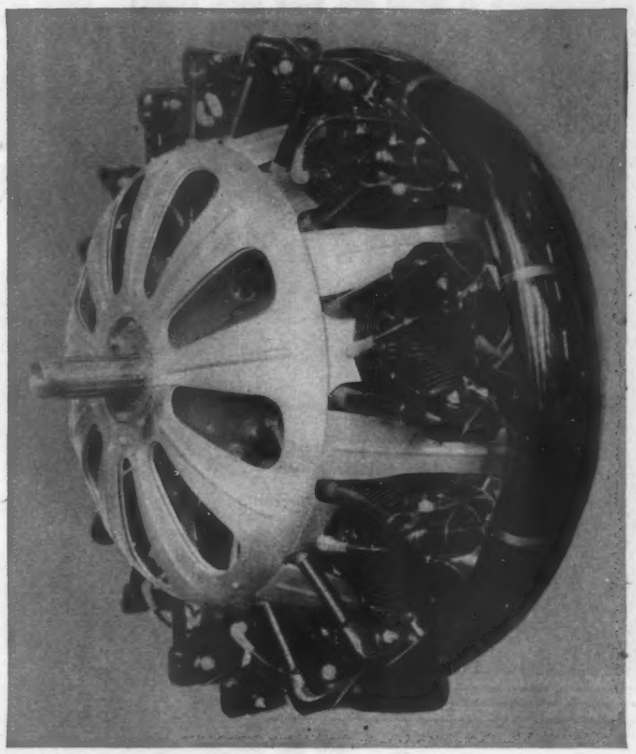
NEW COWLING and MANIFOLD for WASP JUNIOR



A new exhaust collector, nose cowling and pre-heater combination is now ready for use on the "Wasp Junior" 300 H. P. engine, insuring proper engine operation under all weather conditions.

All parts of the cowling and collector are accessible, and engine and accessories may readily be reached. Individual parts may be replaced without disturbing the unit as a whole. Further, the cowling is so constructed that the airplane designer is completely unhampered in providing for its use.

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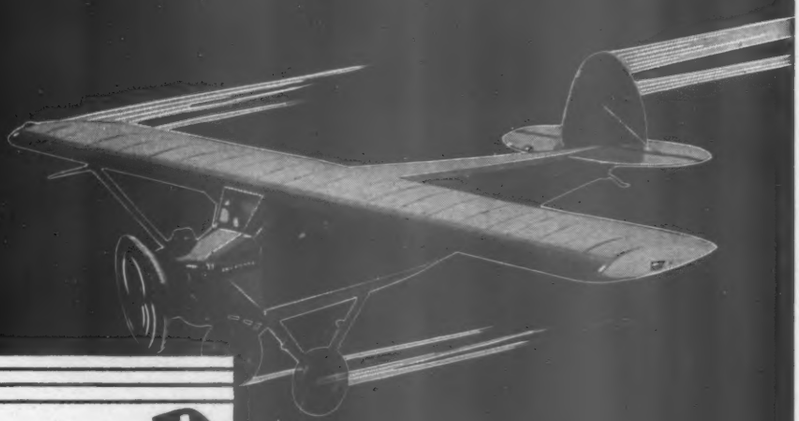

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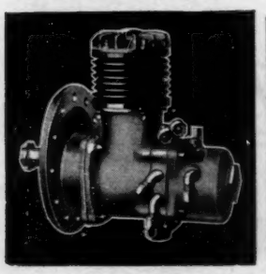

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Ask for Quaker State Aero Oil at your airport. Try it out on your next hop. It's remarkable how it holds its body. It will stand more heat than an ordinary oil will live through—and it will stand up and keep your motor purring its prettiest. Try it!

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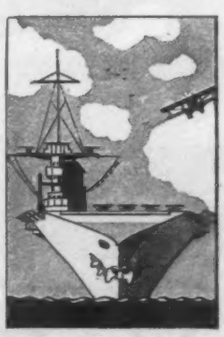
CHANCE VOUGHT  CORPORATION

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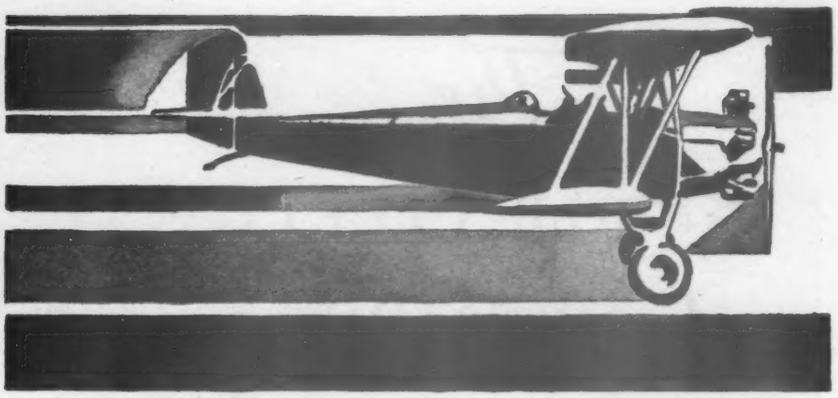

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From $4,985 to $3,985 for THE FLEET Landplane and from $5,885 to $4,995 for THE FLEET Seaplane each powered by the Kinner K5—100 H. P.—engine, flyaway, Buffalo, N. Y.—should be good news to school operators, aviation clubs, sportsmen pilots and any flying-person interested in getting his money's worth. For it is you, who fly and know what to expect of an airplane . . . combined with our increased production facilities . . . that has made possible these substantial price reductions » » »

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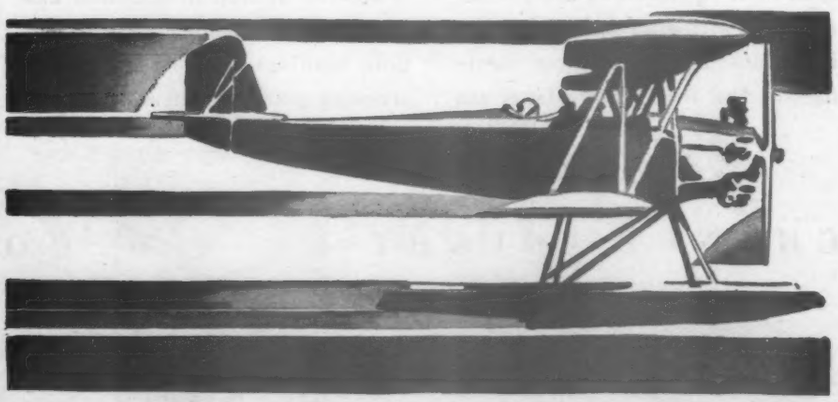

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INDUSTRY sets a new pace. It was therefore a natural development that Black & Decker, the world's largest makers of portable electric tools, chose the Travel Air Six-place Cabin Monoplane to bring their extensive sales territories into closely supervised unity.

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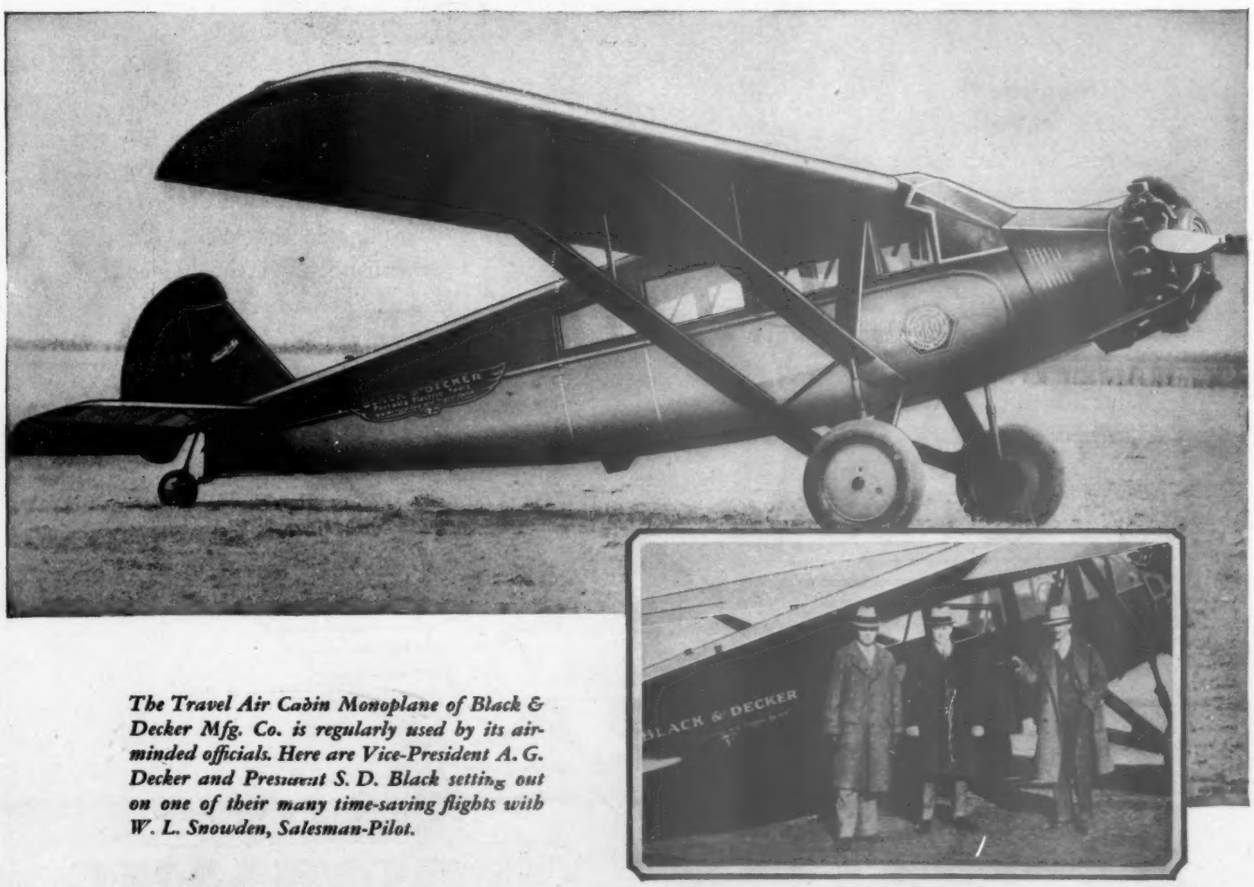

The Travel Air Cabin Monoplane of Black & Decker Mfg. Co. is regularly used by its air-minded officials. Here are Vice-President A. G. Decker and President S. D. Black setting out on one of their many time-saving flights with W. L. Snowden, Salesman-Pilot.

A PLANE FOR EVERY PURPOSE — TRAVEL AIR

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . *March 1, 1930* . . . NUMBER 9

Tell the World

THREE MONTHS AGO it cost as a general rule something between ten and fifteen cents a mile to travel by air. Now the rates range from five to eight cents, a flat fifty per cent drop between the middle of the football season and Lincoln's birthday. Why the cut? What benefit was it designed to insure to the operating companies? Has it done it?

In the exuberant days of last September there was frequent expression of the comforting view that economy was not an objective with travelers by air; that they wanted speed and luxury and would pay any price to secure them; that air transport was immune from any economic competition with organized means of travel upon the surface of the earth.

The holders of that view cooled off under the chilling blasts of traffic analysis. It was grim fact that passengers were not traveling by air in sufficient numbers to carry the inescapable overhead of the operating companies. There have been many explanations, complete or partial, of the comparative failure of the general public to patronize the services provided, but we have settled down to universal agreement that the cost of air transportation is one omnipresent factor, and an important one.

To agree upon the cause was to apply the remedy. Rates were too high and traffic was inadequate. Rates were cut mercilessly and, in some cases, without regard to the possibility of making the new figures balance with present operating costs. Traffic improved, but it should and must improve much more. In our judgment the full possibilities of the rate cut have not by any means been realized, because, in our judgment, the fact of the cut has not yet penetrated the public consciousness.

To us who are professionally engaged in aviation it is a commonplace. It has been so much an outstanding occurrence of the winter season that it is hard for us to believe that anyone could have overlooked it, but make the trial for yourself. Cast yourself in the rôle of the inquiring reporter. Go forth and stand upon a street corner, and ask the first ten men that come along how they think the cost of a trip by air compares with that of the same journey by rail. We shall be greatly surprised if seven of the ten do not reply to the effect that air travel is reserved for millionaires.

The newspapers have given some publicity to reductions in fare at the time when they have been announced, but a story can only be news once, and having once marched across the page it fades from the memory of man. It takes more than one corrective note to obliterate impressions that have, like the general impression of the costliness of air transport, had years to take root.

The economic factor in traffic development is only one of several that have to be reckoned with. There are many journeys that will not be made by air under present conditions, however low the rates may be set,—but if rates are to be whittled away as they have been, at least the operators should get the full benefit of their financial courage. They can only do so by the most persistent advertising of every kind,—newspaper, direct mail, word of mouth. The personnel of every convention that meets in a city served by air lines ought to be circularized, as some of them already have been, by the operating companies that may hope for the patronage of their members. In their publicity work the representatives of the air lines should make it their first business to call attention to lowered cost, the one of their attractions of which the public knows least. Every speech that is made in the interest of air transport, for the next three months at least, ought to be focused upon the subject of low fares as the point of greatest current interest.

Keep at it endlessly, and the idea will at last

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sink home. Means of travel are commonly selected in haste, and almost instinctively, without pause for reflection. To get the relative cheapness of air transport so impressed upon the average business man that he will never overlook it when a choice has to be made still needs long and persistent hammering.

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Parasites on Aviation

ALTHOUGH the stock market's debacle has retarded to some extent the flood of aeronautical security offerings and has reduced the ambitions of promoters so that they are now more likely to start out in quest of $50,000 rather than $10,000,000, it has not exterminated the race of fraudulent financiers. Some of them have gone temporarily under ground. Some have changed the form of presentation of their plans to give them a more altruistic aspect. Some have devised various plausible schemes for persuading the investor that he is being vouchsafed a sacred privilege in being permitted to hand over his money, and that he is being admitted to an elite group. So crude and naïve is the presentation that some of them make for their projects that it is difficult to imagine their taking in anyone who has had the intelligence to accumulate any money for investment, but the sad record of history proves that nothing is so crude or so vaguely roseate that it cannot gather in a respectable coterie of victims.

We have a circular before us as we write. It describes a new kind of "airship" (sic), although apparently lift by the buoyancy of gas, which is the characteristic feature of all airships as correctly defined, plays no part in this design. "The type of plane now in use will never be a commercial success," proclaims the prospectus, "because of—the absence or lack of bird-like features. It is a known and absolute fact that the structure of the present type of plane cannot withstand the tremendous pressure created by air pockets, which have caused many disasters and have taken a toll of human lives." In this novel concept, on the other hand, "the type of rudder used" (which a perspective drawing shows to have the general appearance of a palm-leaf fan) "eliminates the danger of air pockets created by the manipulation of rudder and elevator now used on other planes."

The best that can be said for the coiners of those glittering phrases is that they are totally ignorant of the fundamentals of aeronautical science and of all other science. One might, without undue lack of charity, say of them something far worse than that.

Unfortunately, they do not stand alone. We have recently fallen foul for the third or fourth time in as many years of a gentleman who has some great ideas for giant airplanes. Periodically he appears with a fanfare of trumpets, and presumably raises a little money to start construction. Periodically he fades from view, shortly to break out again in a new place, disseminating anew the same old lot of misleading publicity about a project already in its essentials at least six years old and upon which no perceptible progress has been made in that interval. At best, the promoter is seriously over-optimistic about his own prospects. At worst, again, his activities bear a far uglier interpretation.

The Post Office Department has given attention to some of these gentry, and the Better Business Bureaus have done their best to make life miserable for others, but it is not always easy for those without aeronautical experience to be sure of just what does constitute a manifest impossibility or a prima facie fraud in an aeronautical project. They need help from the experts. The tribulations of aeronautical securities attached to perfectly sound manufacturing or operating enterprises during the past few months make it doubly important that the aircraft industry should be above reproach and above suspicion. We must clean house from within. We must not only bar the gate of our own associations against suspicious intruders, but we must scourge them from the neighborhood. The aircraft industry ought to take for itself the aim of being so respectable as to shed the odor of sanctity upon all who attach themselves to it,—but then its members must make sure that none of the attachments are parasitic, eating away that public confidence that is the root of their future prosperity.

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Liquidating Overproduction

SOMEONE has said that the way to take hold of a distasteful task is with both hands. It does no good to vacillate in the starting of an unpleasant duty, which must eventually be performed. Amply unpleasant, but inexorable, is the duty that faces those units in the aircraft industry which must unburden themselves of a rather considerable number of airplanes now in storage as a result of overproduction during 1929. Factories, distributors, and in some cases finance companies are holding large numbers of aircraft which must be disposed of in one way or another before the industry can return to a normal basis. Every day in storage decreases the intrinsic worth of the airplane waiting to be sold, both on account of actual deterioration and because of the obsoleting process resulting from the passage of time and the introduction of new and improved models of airplanes. A still more important, though less tangible, factor is that aircraft frozen in warehouses act as a direct dam to progress of the industry. As news of the fact that there are many unsold planes on hand leaks out the possible prospects for purchase of new equipment will certainly feel that aviation is a losing business and that immediate plans for entering it, either as a commercial or

private flyer, had better be postponed until the storm blows over. On the other hand, if these stored planes be cleared from the decks at any price which can be obtained they will be in service, more people will be flying and will be converted to flying, the old equipment will be worn out the sooner, and increase in the number of aircraft purchasers will be greatly accelerated.

Naturally many owners of unsold equipment will argue that if they cannot obtain a reasonable price for their merchandise they will be financially ruined. On the other hand it is more intelligent to save something from the wreckage of a production program gone wrong, than to sit by and hope for future salvation with the result that a total loss results. If all concerns holding large unsold stocks of aircraft will liquidate, at whatever price may be necessary, the money realized will make it possible for the stronger ones to continue business on a more intelligently organized program. The weaker ones may hope to save enough from the debacle to retire in good order.

One fact stands out clearly, and that is that our present unsold equipment consists, in large part, of first-class airplanes which will give good account of themselves if placed in service. The quicker they are put to use the quicker they will be worn out and make way for the normal future production. At the same time these planes will be increasing the total amount of flying, training new pilots, and bringing new converts and new prospects to the builders of newer equipment.

Such unloading of frozen stock will hurt those who must sell at a sacrifice, and will temporarily hurt the manufacturer who has kept pace with the market and has no stock overload.

Many have hoped that this "unloading" process might be done in foreign markets, thus save the home situation while building our trade abroad. The export market is, however, still a somewhat unknown and a limited quantity. While making every effort to develop it, we should also clean house at home.

In spite of the recent setback within the industry the business of flying is steadily growing in popularity. We must foster and nurture the growth. Unsold stock is a festering sore in the bosom of the industry, and will hamper the return of healthy business conditions until healed. Drastic and immediate action is needed.

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The New Men in the Industry

DURING the recent rapid expansion of the aviation industry it was necessary to recruit engineering and drafting personnel from other industries, as well as from the ranks of recent graduates in mechanical, civil, and electrical engineering. By proper distribution of the newcomers under the direct supervision of experienced aeronautical engineers and draftsmen, technical work was carried on in a very commendable manner. By proper sub-division of work, and specilization of the aeronautical novices under experienced supervisors, full advantage was taken of their fundamentally sound previous engineering and drafting training.

Thus an immediate and extraordinary demand was successfully met in a logical manner. It is hoped these men, literally drafted for aeronautical service, will remain, to the mutual advantage of the industry and themselves. However, the frenzied days of last summer are over and the industry is pushing ahead on a quieter and sounder basis. Control lines are being tightened, and increased refinement of design detail is the new order of the day.

This requires a far more intimate understanding of aeronautical technical matters on the part of every individual associated with the engineering of a plane design. Only by the intelligent contribution of the initiative and design sense of every one engaged in engineering work can the new objective be attained. It is a time for these relatively new recruits to aviation engineering to take stock of themselves, and acquire a more intimate knowledge of fundamental aeronautical design precepts if their own future personal success is to be assured.

It is believed that most of these men are willing,—that they will take any reasonable and available steps to better equip themselves for success in aeronautical engineering and drafting. Unfortunately, a survey of the possibilities for further education shows them woefully weak. True, there are ample educational opportunities available for the prospective practical man—the pilot, mechanic, etc.—in the excellent aviation schools reasonably well distributed about the country. There is a wealth of opportunity for the veritable tyro who seeks general elementary aeronautical knowledge, but the men under discussion need far more advanced technical information.

True, they have available post-graduate courses in the universities with aeronautical departments, but as in most instances they must be self-supporting this is not a practical solution. Where the particular aviation concern for which they are now working is located in centers close to these aeronautical colleges, satisfactory arrangements for extension courses could undoubtedly be made. Unfortunately, the aviation industry is widely scattered and in most instances in relatively small communities far removed from such opportunities.

What is believed to be very badly needed is an authoritative correspondence course in airplane design under the auspices of one of the recognized universities teaching aeronautical engineering. Such a course should be based on a prerequisite of an engineering degree or its equivalent in practical experience, and should emphasize the applications of aerodynamics and structural analysis to the design of a plane. That such a course would be enthusiastically welcomed, and prove a distinct contribution to the aeronautical industry, is firmly believed.

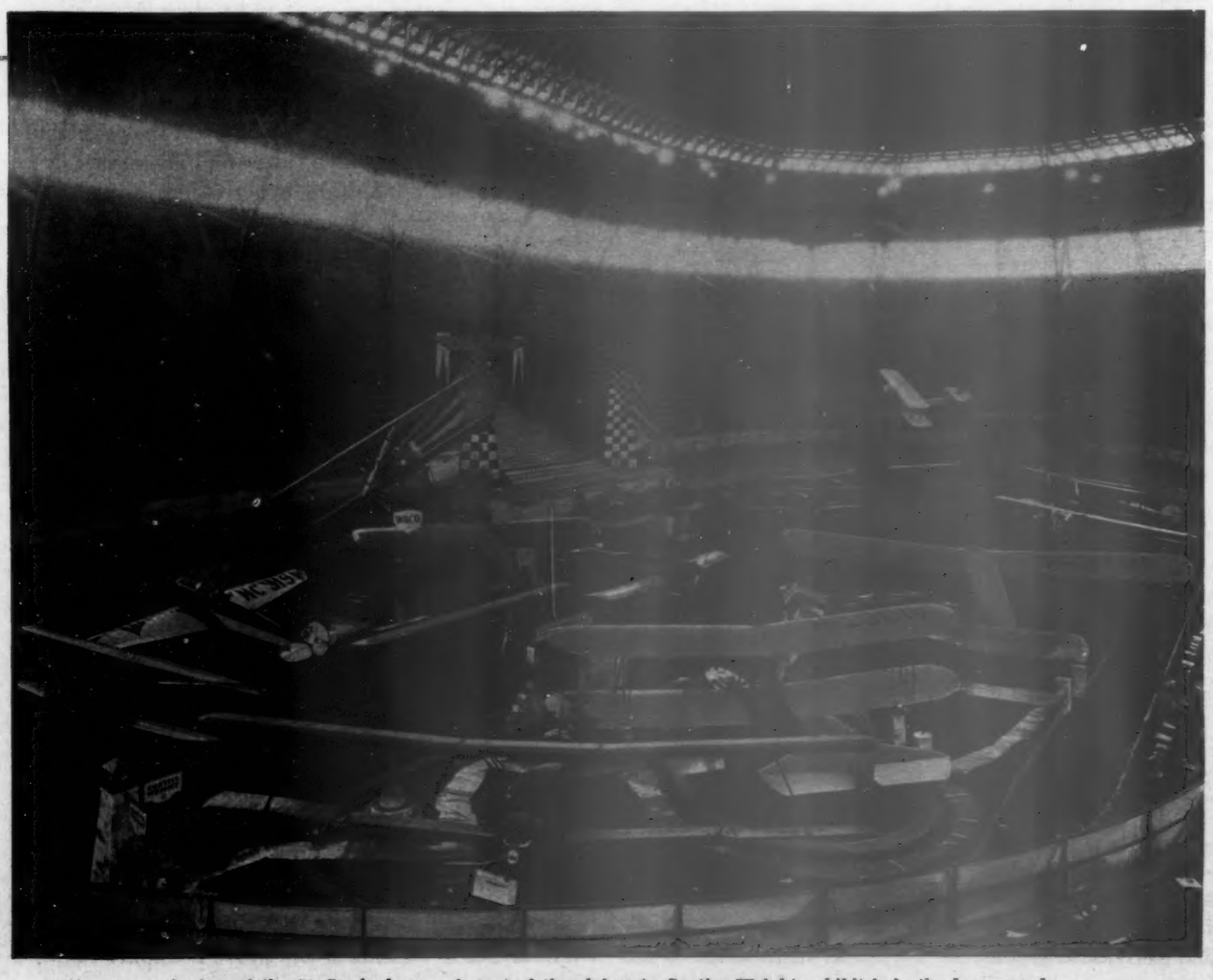
THE *St. Louis*

Second International Aeronautical Exposition is Colorful

By JAMES P. WINES

THE SECOND International Aeronautical Exposition, held late last month at the Arena in St. Louis, without question was the most colorful aircraft show that has ever been conducted. The interiors of the exhibition hall were lavishly decorated, and that combined with the brilliant hues of the planes exhibited, as well as the colors used to decorate the booths of engine and accessories manufacturers, made the show what is was.

From the technical angle, there was little that was new. It is true that certain refinements in design have been affected, but for the most part there were very few structural changes in the new models over those exhibited at previous showings. On the other hand, the planes revealed the fact that the manufacturers are making a definite attempt to beautify products. The makers



A view of the St. Louis Arena. A part of the elaborate Curtiss-Wright exhibit is in the foreground

SHOW

But Reveals Few New Designs

Above; a revolving Fleet, part of the Universal exhibit. Below; the Lockheed exhibit of the Detroit Aircraft Corp.

of airplanes are now reaching out to the public in general, which includes a large class of potential buyers not yet educated to the technical side of aviation.

Striking color combinations, such as orange and black, predominated in the exterior finishes. The interior of the cabin planes, a little more quiet for the most part, were also designed to catch the eye. Colored leathers, tapestries, plain and figured velours are now finding a place in the modern plane. In fact, many of the cabin planes now rival the interiors of the most expensive automobiles. Comfort, too, is being emphasized. Seats have been made more comfortable; their arrangement has been improved; and more and more manufacturers are discarding the old and inexpensive rubber shock cord in favor of hydraulic or other shock absorbing units.

Yet the show was a disappointment. The Arena, where the exhibition was housed, was constructed as the home of a dairy show, and frankly is much more suitable for that than for the purpose of holding an aeronautical exhibit. It consists of three buildings. The central structure is an arena, with a tanbark ring and the galleries completely encircling it, while on either side is a large barn-like structure. Ordinarily the three buildings are not connected, but enclosed plaster-board passageways were constructed in preparation for the aircraft show.

THE ADDITIONS to the east and west of the Arena, which are known as buildings "A" and "B" respectively, it is understood, were used to house cattle during the dairy show. In fact, the concrete floors are said to have been laid there just before the aeronautical exposition was held. Formerly the flooring was dirt. However, the arena remained covered with its layer of tanbark, and there was sawdust in the passageway between the buildings. Of course, that may have been an attempt to create proper atmosphere. The shoes and trouser cuffs of a person who walked through the exhibit were sure to look as though he had spent a day at a dusty airport.

The floor of the exhibition hall totaled some 300,000 sq.ft. A complete circuit of the building, starting and finishing at one end, would give the average visitor all the exercise that he wanted in one evening. But the only entrance where tickets were sold was at the front door of the center structure. There were other entrances at the rear building "B" for those who parked their cars in the space provided there for that purpose, but there was no ticket office, which made it necessary for everyone except the exhibitors to utilize the front door. Even making use of those entrances, however, necessitated walking. No vehicles were allowed in front of the structure. If one drove up in a taxicab, he left it at the west of the building and walked to the entrance. If he came in his own car, he parked it in the nearest parking space and walked still farther.

Inside, the visitor had three alternatives. He could go directly to the tanbark ring, and, incidentally, to get down to the floor it was necessary to descend a flight of stairs; he might turn to the right, walk half way around the arena to the passageway leading to buildings "B," or he might go to the left, eventually arriving at building "A." No matter what he did, he stood excellent chance of loosing himself in the maze of corridors. The main rest rooms, it might be added, are on the mezzanine floor.

For a circus, a boxing match, or anything of the sort where the spectators remain seated all evening, the arena is doubtless well planned, but it is a poor place for an aircraft show.

Building "B" was the most attractively decorated and arranged of the three. There were three more planes in the structure by actual count than there were in building "A," but they were of smaller type. As a result,

one obtained an impression of spaciousness entirely lacking in the other structure. The exhibits at this exposition showed the result of the many mergers that have taken place in the last few months. In many instances, space was taken under the name of the holding companies, and several makes of planes were displayed in the same booth. That fact was detrimental to the appearance of building "A." The main Curtiss-Wright exhibit was located in that structure, and of course the 20-passenger Keystone-Loening "Patrician" and the 18-passenger Curtiss "Condor" were included in the display. The Patrician was of such size that its wing almost scraped the criss-crossed pipes, which contained the wiring and supported the lighting fixtures of the building, while the Condor had to be set up with the pipes running between the wings. The largest plane in building "B" was a Ford tri-motor.

THE EXHIBIT of Detroit Aircraft Corporation was the largest in "B." Seven of the 35 planes displayed in the building were on exhibition in the space allotted to the Detroit concern. These were the new Lockheed "Sirius," the Lockheed "Executive," Parks P-1, Parks P-2, the Eastman "Flying Yacht," the Ryan B-5, and the smaller Ryan C-1. The latter is a new "Whirlwind-Seven" powered, four-place monoplane, which was unveiled the first night of the show. After the manner of most of the new planes, the wing was painted a brilliant orange, while the fuselage was done in tan and cream color. Incidentally, the Ryan C-1, or "Foursome," as it was called by some of the representatives of the company, was one of the growing number of four-seater planes that made their appearance at the show.

The cabin interior of the new Ryan is done in velour. The top is plain brown, while figured material is used for the side walls and the seats. The rear seats, which are staggered, are the arm chair type and may be tilted backward. The pilot's seat is a bucket affair. The one alongside it is of the folding variety, and looks for all the world like one of the front seats that may be found in almost any two-door sedan. However, it is possible to place the back of the seat in a horizontal position by moving it backwards as well as forward. The feature of this arrangement, lies in the fact that the folding front seat becomes a bed when used in conjunction with the rear seat on the right side.

The floor rug is of the ordinary automobile variety. The hardware, again, is of the automobile type. A cloth pocket on the door is exactly what might be found in an automobile. The rudder and the brake pedals show striking similarity to the clutch and brake pedals of the modern motor car. The curtains over the windows and the dome light are like those to be found in the sedan.

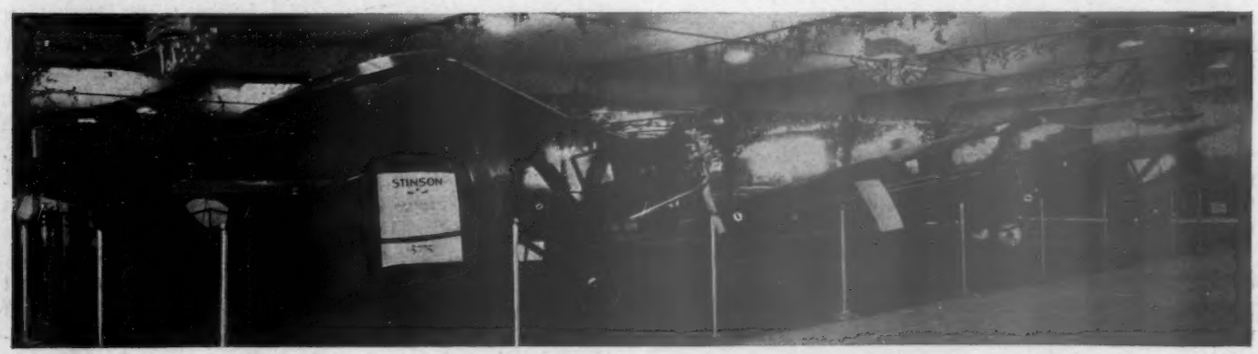
The interior appointments of the new Ryan have been described somewhat in detail. Naturally, the interior decorations of the other planes on display at the show differed slightly. Some manufacturers used richer fabrics, some large patterns. Leather and leather in combination with fabric were to be found. Structural members entering the cabins were painted or covered with fabric. The latter, it might be said, seems to be the better way of handling those necessary evils. Walnut strips in nearly all instances were used to finish the window ledges. In a word, practically every cabin without exception showed the influence of the closed car.

Of all the planes exhibited by Detroit Aircraft Corporation, the new Lockheed "Sirius" attracted perhaps the most attention. This was due no doubt to its striking appearance, and the fact that the show model was a duplicate of the one now owned by Colonel Lindbergh. The Sirius is a low-wing monoplane, powered with a Pratt & Whitney "Wasp" engine and equipped with the N.A.C.A. cowling, and it looks fast. Wheel pants contributes to the effect. The wing and the tail surfaces of the one on exhibit were painted orange while the fuselage and landing gear were black.

A training glider produced by Gliders, Inc., also attracted much attention, as did a cutaway section of the cabin of a Lockheed "Vega."

CORD CORPORATION had a booth about one-half the size of that occupied by the Detroit concern. In that space three models of Stinson monoplanes were shown. There was very little decoration. The Detroit company had pillars, which formed the entrances to its space, painted in checkerboard fashion in black and orange to look like pylons. Smaller pillars, joined by chains which were painted orange, marked the boundaries of the display and carried out the color scheme. It was really very effective. On the other hand, the simplicity of the Cord Corporation exhibit made it almost if not equally as effective. A green floor cloth was used, with standards carrying a red plush colored rope placed around the outer edges. The three planes—a Wasp, a "Whirlwind-Nine," and Lycoming powered Stinson Detroiter—were placed in the booth at an angle.

Other planes on display in building "B" included a Command-aire biplane; a Buhl sesquiplane; two St. Louis Cardinals; the Pratt & Whitney powered Ford transport; an American Savoi-Marchetti amphibion, powered with a Kinner engine; a Lincoln PT; the New Standard; four American Eagles, one powered with a new 190-hp. Kinner five-cylinder engine; two Davis parasol monoplanes; two Barling NB-3's, two Spartan biplanes;



The display of the Stinson Aircraft Corp. The new four passenger Stinson Junior is shown at the left.

The Curtiss-Wright exhibit, showing the Keystone-Commuter set up in an artificial pond

a Fokker Super-Universal; a Fleet biplane; a Whittlesey Avian, and a Heath parasol monoplane.

The Nicholas-Beazley exhibit which featured the Barling NB-3 is worthy of comment. The ceiling of buildings "A" and "B" were so low that it was impossible to hang any of the planes exhibited in flight positions. However, those in charge of arranging the Nicholas-Beazley booth overcame this difficulty nicely. The tail of one of the two Barlings on display was hoisted up, so that the plane with the wheels touching the ground looked as though it were in a dive. To make the picture more realistic, two clothes dummies attired in flying togs were seated in the forward cockpit to represent passengers, and another dummy occupied the pilot's seat.

The tanbark ring of the Arena proper seemed to be chiefly a connecting link between the two buildings to the east and west. Seventeen planes were exhibited there but several of them were shown in the other exhibition halls. Curtiss-Wright was the only exhibitor in the Arena to arrange real display. It had about a quarter of the entire space in the ring, and decorated the area to look as much as possible like a garden. The tanbark was covered with imitation grass, with walks of linoleum done in imitation of flagstone. A small hedge further removed the booth from the circus atmosphere of the rest of the ring. Four planes were shown. These were the Curtiss "Tanager," which won the $100,000 Guggenheim safety contest, the Curtiss "Kingbird," the Travel Air, Mystery plane, and the Keystone-Loening "Commuter" amphibion. The latter attracted perhaps the most attention, since it was afloat in a water-filled concrete basin. The Kingbird also proved quite an attraction..

The remaining thirteen planes in the Arena were a Fairchild KR 21; a Mohawk low-wing monoplane, powered with a Kinner engine; a St. Louis Cardinal, the Buhl Airsedan "Spokane Son-God"; a Barling NB-3 mounted on skis; a Lycoming Stinson; the "Baby Ace," a new single-seater, externally braced cabin monoplane powered with a three-cylinder Szekely air cooled engine; a Waco straight wing model; a General Airplanes Corporation "Aristocrat"; an American Eagle cabin monoplane; the Aeronca C-2, the light plane recently placed on the market by Aeronautical Corporation of America; the Great Lakes Sport Trainer; a Command-aire biplane equipped with Edo seaplane float, and a Wright Whirlwind-Seven powered Waco Taperwing. The Command-aire and the Taperwing were supported in flight position by cables dropped down from the roof.

At one side of the Arena a stage was constructed for the performance of the "Wings of 1930," a musical extravaganza held in conjunction with the show, on which the curtain was rung up nightly at 10 o'clock.

BY FAR the largest single exhibit in building "A," as in the Arena, was that of the Curtiss-Wright organization. In addition to displays of the Curtiss-Wright lines of engines, the company exhibited 11 planes. These were the Patrician; Keystone-Loening "Airyacht"; the Condor; three-place Travel Air biplane; the six-place Travel Air cabin monoplane, powered with a Wright Whirlwind-Nine; the Curtiss "Carrier Pigeon"; a "Moth," equipped with Edo seaplane floats which were painted green and silver to match the color scheme of the fuselage and wings; a "Moth" landplane with pyralin enclosures over both cockpits; and three models of Curtiss "Robins."

One Robin was of the well-known three-place type powered with a OX-5 engine. The second was also one

An exhibit of aircraft sanitary equipment manufactured by the Imperial Brass Mfg. Co.

of the three-place planes, but it was powered with a Wright "Whirlwind" engine, and equipped with a tail wheel and brakes. The third product of the Curtiss-Robertson Aircraft Manufacturing Company was a new four-place Robin. The plane was practically the same as the three-place model, except for the fact that the fuselage had been widened by four inches to allow installation of a double seat in front instead of usual single pilot's seat.

Other planes exhibited in building "A" included two Bellanca "Pacemakers," one equipped with seaplane floats, again Edo, and the other with the usual landing gear; the Ford tri-engined de luxe club plane; two Wacos, one powered with a Kinner and the other with a Whirlwind-Seven engine; a Fleet biplane displayed on a revolving stand in the center of the Universal Aviation Schools exhibit; a new Lenert all duralumin three

place biplane; an Inland Sport plane; the Rearwin Ken-Royce, two Cessna cabin monoplanes; the Verville "Aircoach"; a Fairchild KR 21; a Fairchild KR 34; the model 71 Fairchild monoplane; the Fairchild 42; a Monocoupe; a Pitcairn; the new Driggs "Skylark"; the Ireland N-C-2 cabin amphibion, and the Ireland "Privateer," a newly designed low-wing two-place flying boat.

Besides the two Cessna monoplanes, the Cessna exhibit included a new training glider, which attracted much attention. In fact, judging from the large number of persons that inspected it and the glider exhibited by Detroit Aircraft Corporation, it would seem that the glider market would be a good one for exploitation by the manufacturers of powered planes. So far as the planes themselves were concerned, the public seemed to be most interested in a very large and the very small models. The seaplanes and flying boat did not attract the attention that might be expected. However, that was not true of the amphibions.

More cutaway models of engines were in evidence in the St. Louis show than at any previous exposition. Among them were models of the 100-hp. Kinner, the Wright J6-9, the Comet, the Continental and the Tiger. Of these the Comet deserves especial mention. The manufacturer of this engine not only showed a crankshaft and piston rod assembly that rotated as it does in an assembled engine when in operation, but a cross-section of one cylinder and the crankcase designed to illustrate the novel valve action and timing of the power plant. Those engine builders that did not show working models exhibited various parts.

As a whole the displays arranged by the engine manufacturers were extremely attractive. Chief among them were the Pratt & Whitney, Curtiss, Continental, Wright, Fairchild, Comet, Michigan Aero Engine, Kinner, Chevrolet, Lambert, Western Enterprise, Tiger, Warner, Lycoming and the Bliss "Jupiter" exhibits. Incidentally, Fairchild Engine Corporation, Warner Aircraft Corporation, and Kinner Airplane and Motor Corporation exhibited new models.

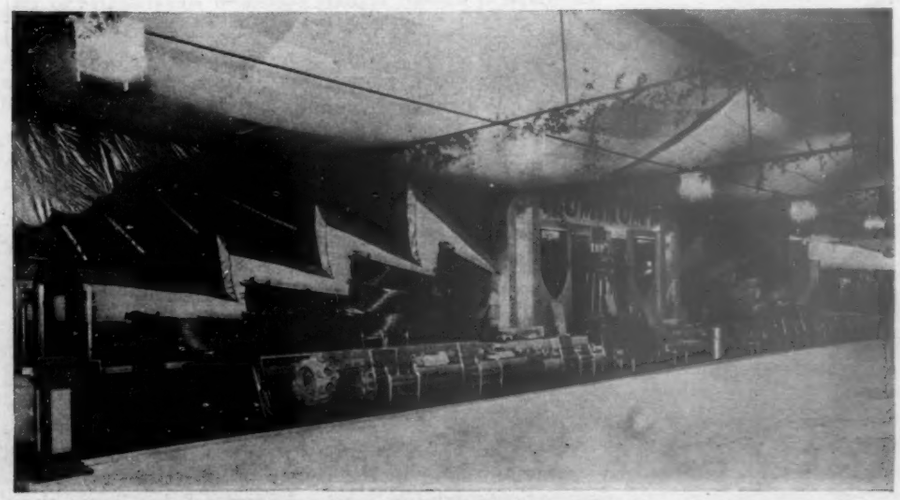
The Kinner exhibit was perhaps the most unusual of all. The back of the booth was of red plush, with the name, "Kinner," emblazoned against it in neon letters. Below the neon sign were the words, "New 190 Horsepower Motor." The floor of the exhibit was raised perhaps 6 or 8 in. above that of the exhibition hall, and was carpeted. There were two entrances at the front near the ends. Between these entrances, and at the ends of the exhibit were wood and plaster-board partitions with modernistic pillars at the ends and corners. These were done in yellow, red, and black. The center one of the three engines on display was the new 190-hp. five-cylinder power plant, while the others were of the 100-hp. type. One of these was the cutaway model.

The Comet Engine Corporation booth should be mentioned also. The design was not out of the ordinary. However, its feature lay in the fact that it is portable. As a matter of fact the booth was nothing more or less than a large screen, with dark blue velvet hanging in loose folds from the nickeled frame. The shape can be changed as a result of its construction to fit to spaces of various sizes and shapes. It will probably be seen at other shows in the future in which Comet Engine Corporation is an exhibitor.

The well laid out exhibit of The Dayton Mfg. Co.

Two of the most attractive of the accessory and materials manufacturers exhibits were those of the Bendix Aviation Corporation and Aluminum Company of America. The Bendix display included exhibit of Scintilla magnetos, Eclipse starters, Bendix brakes, Pioneer instruments, and Stromberg carburetors. The Aluminum Company showed samples of its products now widely used in aircraft.

The National Show conducted annually by the Aeronautical Chamber of Commerce is an excellent criterion of the development of the aircraft design. That being the case there is but one conclusion to draw—a temporary plateau has been reached in design which bears an undeniable similarity to that reached in automobile construction, although it must not be assumed that the airplane is permanently stabilized.



The very attractive exhibit of the Aluminum Company of America

Airplanes AT THE *Show*

An Analysis of the Group With Descriptions of the Newer Types

By LESLIE E. NEVILLE
Technical Editor of AVIATION

REFINEMENT of detail rather than radical departure from conventional design standards was the keynote of the group of airplanes, engines, and accessories exhibited at the National Aeronautical Exposition held February 15th to 23rd at St. Louis, Missouri. Although the display might have been a disappointment to those looking for sensationally new types, there was an element of interest in examining the details of designs which have undergone a gradual evolutionary process. By making a study of these details it is possible to sum up to some degree the progress of engineering.

Several of the visitors had hoped to see the Autogiros and the tandem engine installations that have caused so much comment during the past year. The floating aileron embodied in the design of the Curtiss Tanager were probably the most unusual departure from standard aerodynamic practice. It was the only plane having wing flaps and slots, while the Whittelsey Avian had slots alone.

It is our intention to devote this article to an analysis of the airplanes as a group with special attention to the newer models. The engines and accessories will be considered in detail in the March 8 issue. Comparison will be made with the exposition held in connection with the National Air Races in Cleveland last August and also with the Detroit show of nearly a year ago. A comparison of the characteristics of the three groups of airplanes is given in Table I.

The question of monoplane or biplane does not seem to have changed appreciably during the past year, and in this respect the airplanes at the St. Louis show seem to have been almost equally divided, with a suggestion of increase on the part of the monoplane and a decrease on the part of the biplane. The proportion of sesquiplane type seems to remain fairly constant.

The proportion of closed and open planes also seem to be very nearly equally divided. A slight but significant drop is noticeable in the proportion of land planes at the St. Louis exposition and a corresponding increase in the number of seaplanes, flying boats and amphibions. Single-engine craft still lead by a large majority while there are relatively few two- and three-engine planes as has been the case before.

While the table shows that there was six of the eighty-four planes in the one-place class, this may be somewhat misleading because of the fact that these were about equally divided as to purpose, one group being for sport and secondary training use, while the others were mail carrying types having space merely for one pilot. The Curtiss "Carrier Pigeon," Great Lakes, and Pitcairn are examples of the latter group while the Aeronca, Baby Ace, and Heath, represent the former.

The situation existing between the two- and three-place plane groups is interesting. Although there were twenty-three two-place and twenty-four three-place airplanes at St. Louis, the proportion of their total to the total number of airplanes at the show is somewhat smaller than it has been in the past. This might be interpreted as meaning that airplanes are now being built for specific rather than general purpose. Advances have been made by the four-place type, most of which are the "chummy" closed monoplane models and several interesting examples were included in the group displayed at St. Louis. The fact that there was an excellent representation of the larger transport planes ranging in capacity from twelve to twenty-two persons is partly due to the unusual space facilities at the Arena and partly to the rapid development that has been going on for the past year in the design of airplanes of this category.

Airplanes powered with radial engines are still far in the lead, but not quite as much so as they were at Cleveland and Detroit. The vertical and inverted in-line types, as well as the water cooled, exclusive of the OX-5 were more in evidence at St. Louis, the latter by virtue of the presence of the Curtiss "Carrier Pigeon" and Condor planes which are the first to employ the Curtiss Conqueror engine commercially.

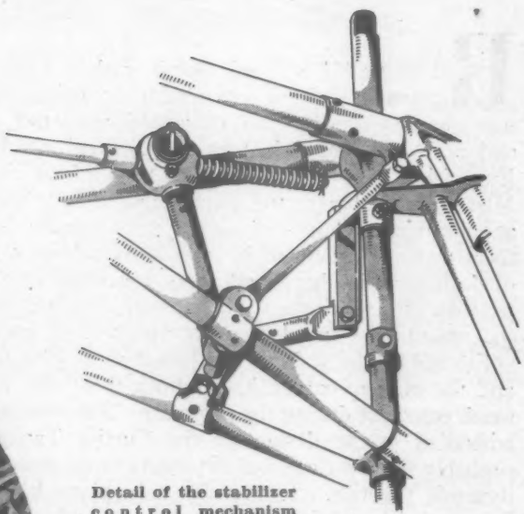
CLASSIFYING the airplane as to horsepower range, a slight increase is noticed in the band from 0 to 50 horsepower, while a marked decrease is observed in the 50 to 150 horsepower range. Recent engine development has given rise to a considerable increase in the 150 to 200 horsepower range while those in the 200 to 300 horsepower group have nearly doubled since last year's Detroit show. The tendency toward low wing monoplane, which reached its height at Cleveland, seems to have diminished to a level even lower than that of last year's Detroit show. There were no airplanes at St. Louis of the so-called center wing type and a substantial drop in number of folding wing machines was observed.

Approximately sixty-five per cent of the landing gears were equipped with Oleo shock absorbers of various

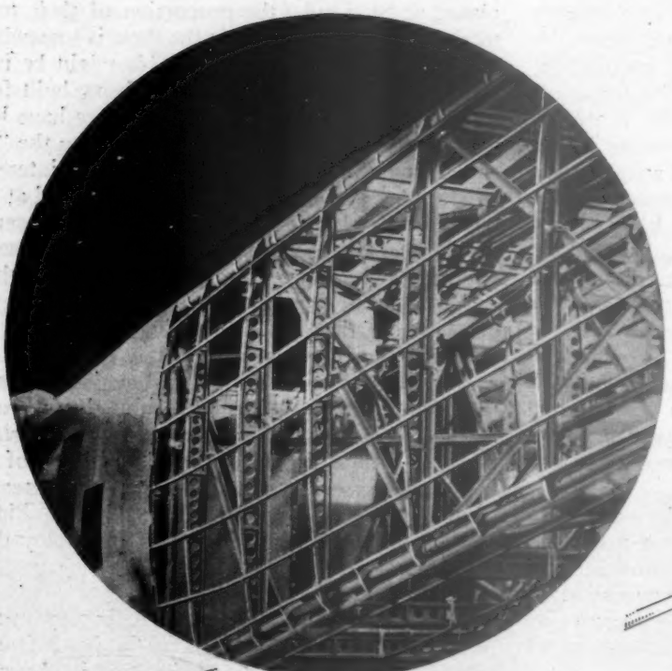
Side view of the Curtiss Kingbird showing the double rudder and tail wheel assembly

THE NEWEST PRODUCT OF CURTISS . . .

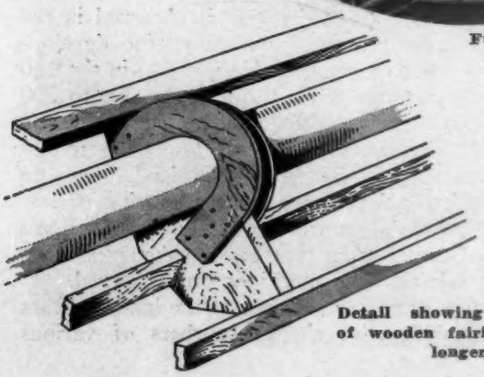
The "Kingbird"



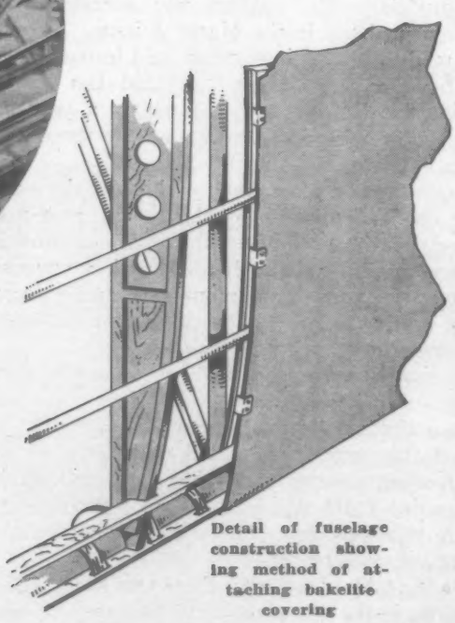
Detail of the stabilizer control mechanism showing screw arrangement for close adjustment



Fuselage construction of the Kingbird



Detail showing attachment of wooden fairing to lower longeron



Detail of fuselage construction showing method of attaching bakelite covering

types, while the remainder were of rubber cord, rubber disks, springs or various combinations of these. Forty-seven per cent of the airplanes were equipped with tail wheels and brakes while approximately thirty-five per cent were not equipped with brakes and had the ordinary type of tail skid. The remainder were equipped with brakes but had skids instead of wheels. Most of the training planes were included in the latter two groups while the aircraft intended for sport and business use were in general equipped with wheel brakes and tail wheel. Nearly seventy per cent of the airplanes at St. Louis were shown with metal propellers, while the remainder were fitted with wooden ones, no composition type having been included on the airplanes exhibited.

A CLASSIFICATION of the group as regards gross weight shows four in the range from 0 to 1,000 lb.; twenty-five between 1,000 and 2,000 lb.; twenty-one between 2,000 and 3,000 lb.; thirteen between 3,000 and 4,000 lb.; ten between 4,000 and 5,000 lb.; five between five and six thousand pounds; and six of more than 6,000 lb. gross. It is interesting to note at this point that forty-six per cent of all the airplanes shown were in the group between one and two thousand and two and three thousand lb. gross. Several of the improved designs at the show were considerably lower in weight than their predecessors, one of the interesting examples of this type being the new Waco straight wing models completed shortly before the show and powered with the Warner and Kinner engine. Both of these planes were three place craft following the Waco construction and design in general and both weighed less than 2,000 lb.

As previously mentioned there was a noticeably small number of low wing monoplanes. The new Mohawk "Pinto" and the Barling NB-3 being the only examples of this type. A number of refinements have been made in the Mohawk plane and a new type of radial engine cowling was introduced on the show model. This cowling consisted of individual metal fairings streamlined and covering each cylinder completely with a number of adjustable holes in the front to permit of air flow. The metal wing structure of the Barling NB-3 was shown in connection with the exhibit and has not been modified appreciably excepting at the tip which are faired off to give a more finished appearance, increase the aerodynamic efficiency, and at the same time provide hand holds for ground maneuvering.

Efforts are being made on the part of manufacturers and designers of cabin monoplanes to provide greater visibility above and behind and a large number of the planes of this type at the show were equipped with transparent wing coverings for the center section. In one

Table I: Types at Detroit, Cleveland, and St. Louis Shows

	Detroit Show		Cleveland Show		St. Louis Show	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Total planes entered	100	..	56	..	84	..
Monoplanes	48	48	33	59	44	52
Biplanes	47	47	21	37.5	37	44
Convertible	1	1	0	0	0	0
Sesquiplanes	4	4	2	3.5	3	4
Open planes	53	53	31	55	41	49
Closed planes	47	47	25	45	43	51
Land planes	95	95	51	91	75	89
Seaplanes, flying boats	3	3	3	5	5	6
Amphibions	2	2	2	3.5	4	5
Single engined	95	95	49	87	79	94
Twin engined	1	1	2	3.5	2	2
Three engined	4	4	5	9	3	4
One place	4	4	4	7	6	7
Two place	32	32	19	34	23	27
Three place	29	29	13	23	24	28
Four place	11	11	5	9	12	14
Five place	5	5	2	3.5	2	2
Six place	9	9	8	14	7	8
Seven place	2	2	0	0	3	4
Eight place	5	5	1	2	3	4
Twelve or more	3	3	3	5	4	5
Radial engined planes	90	90	51	91	72	86
Vertical in line air cooled	10	10	5	1	5	6
Opposed	..	..	..	..	1	1
Inverted in line air cooled	..	..	..	..	1	1
Water cooled (other than OX-5)	..	..	..	..	2	2
OX-5	9	9	0	0	3	4
0–50 hp	3	3	1	2	3	4
50–150 hp	50	50	22	40	27	32
150–200 hp	14	14	11	20	17	20
200–300 hp	11	11	11	20	18	21
More than 300 hp	27	27	11	20	16	19
Low wing	6	6	6	11	4	5
Center wing	3	3	2	3.5	0	0
Folding wing	7	7	4	7	2	2

Table II: General Characteristics of a Group of the Newer Airplanes at the St. Louis Show

Manufacturer	Designation	Type	Make of Engine	No. of Seats	Fuselage or Hull Construction	Wing Construction	Dimensions: Span	Dimensions: Length Overall	Wing Area (Sq.Ft.)	Weights: Weight Empty (Lb.) *	Weights: Normal Gross Weight Loaded (Lb.)
Aeronca	C-2	OML	Own	1	Wl-St	Wd-F	36′	20′	140	365	700
Baby Ace	S.S.P.	CML	Szekely	1	Wl-St	Wd-F	25′8″	17′5″	108	500	800
Curtiss-Wright	Condor	CBL	2-CQ	20	StDF	StDRW-F	91′8″	57′1″	1,512	11,352	17,378
Curtiss-Wright	Carrier Pigeon	OBL	CQ	1	Mon-D	D-St-F	47′5¼″	34′6½″	550	4,212	7,600
Curtiss-Wright	Keystone Commuter	CBA	J-6-9	4	D-B-D	Wd-F	36′	31′10″	389	2,740	4,000
Curtiss-Wright	Kingbird	CML	2-J-6-7	7–8	Wl-St-Ba	St-D-F	54′6″	34′9¼″	405	3,824	5,824
Driggs	Skylark	OBL	Ro	2	Wl-St-F	Wd-F	28′3″	22′6″	185.6	864.1	1,371.1
Fairchild	42	CML	J-6	4	Wl-St	Wd-F	45′6″	31′	290	2,720	4,300
Ireland	M-1	OMF	LB	2	Wd-A	Wd-S-F	36′8″	26′	198	1,015	1,520
Ryan	Foursome	CML	J-6-7	4	Wl-St	Wd-F	39′3″	27′7″	220	2,000	3,000
Savoia-Marchetti	S-56	OBA	K-5	3	P-F	Wd-F	34′1¼″	25′	286	1,447	2,150

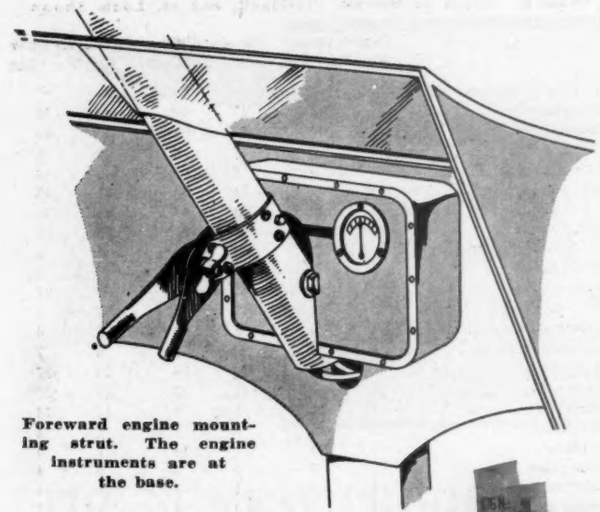
TYPE
C —Closed
O —Open
B —Biplane
M—Monoplane
L —Land plane
F —Flying boat
A —Amphibion

ENGINE
CQ —Conqueror
Ro —Rober
J-6 —Wright
LB —LeBlond
K-5 —Kinner

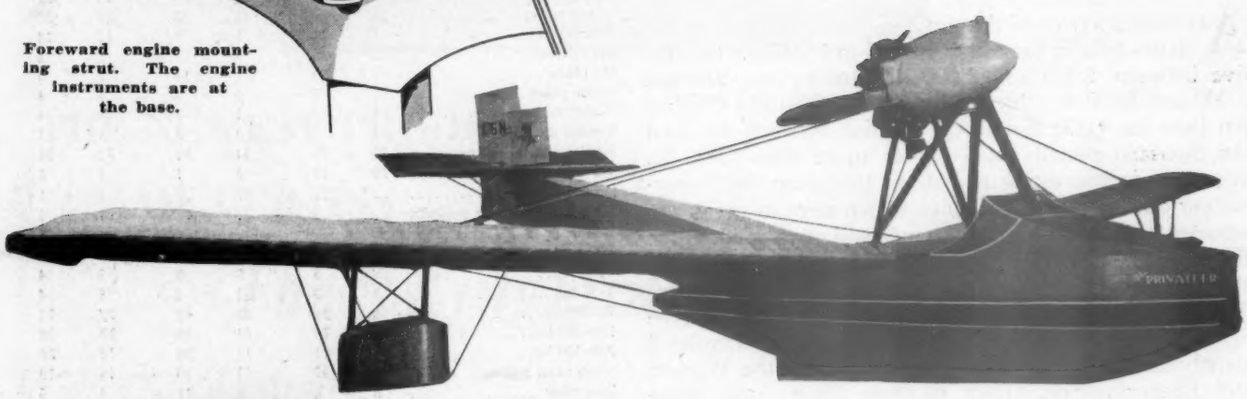
CONSTRUCTION
St —Steel tube
D —Duralumin
Wl —Welded
R —Riveted
Mon—Monocoque
Ba —Bakelite
A —Alclad
B —Bolted
W —Wood
F —Fabric
S —Steel
P —Plywood

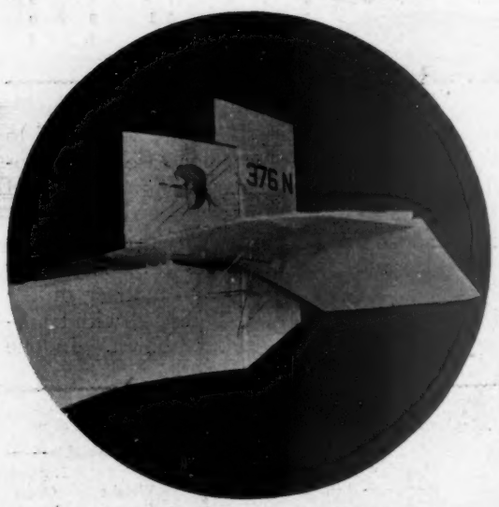
*With water if water cooled engine is used.

THE IRELAND *"Privateer"*

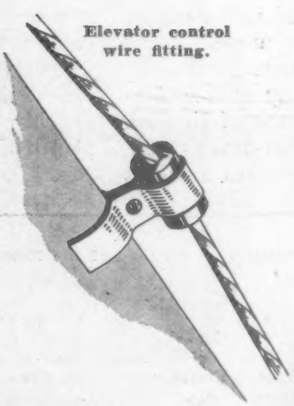


Foreward engine mounting strut. The engine instruments are at the base.

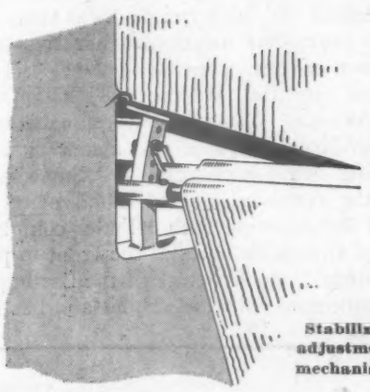




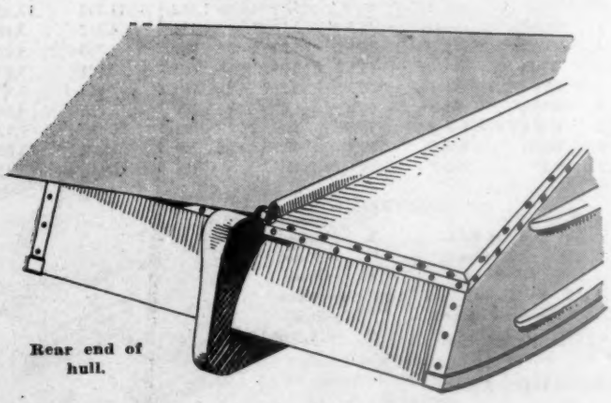
Detail of the tail surfaces.



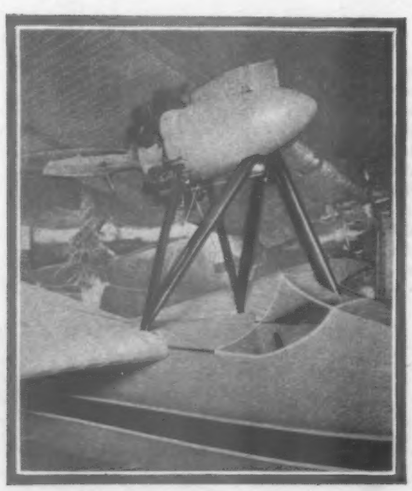
Elevator control wire fitting.



Stabilizer adjustment mechanism.



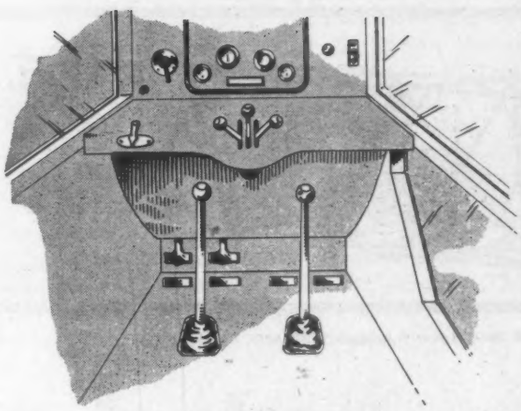
Rear end of hull.



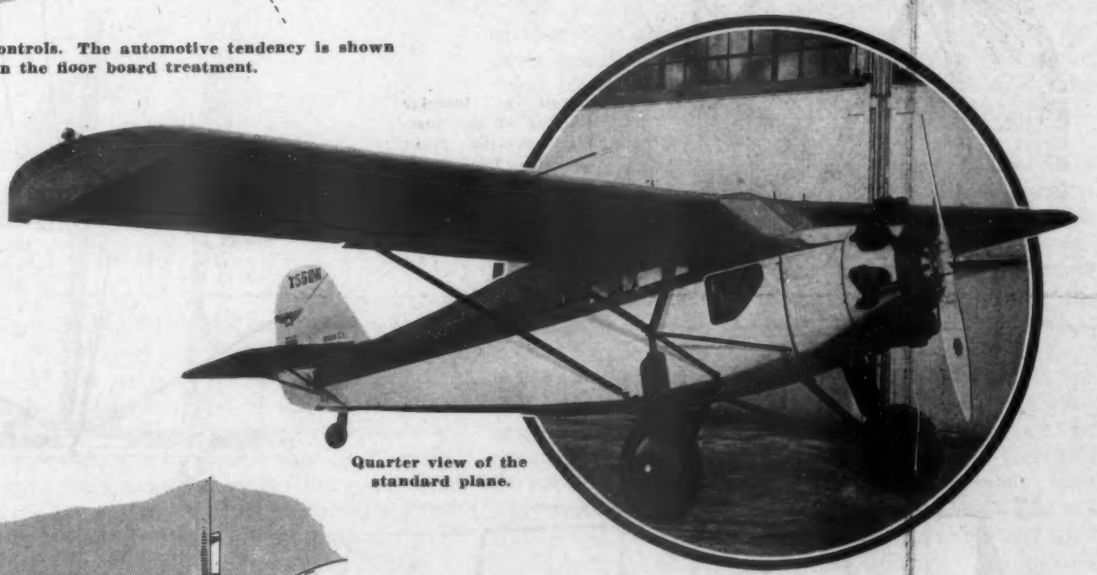
Close up of engine nacelle and cockpit.

THE RYAN
"Foursome"

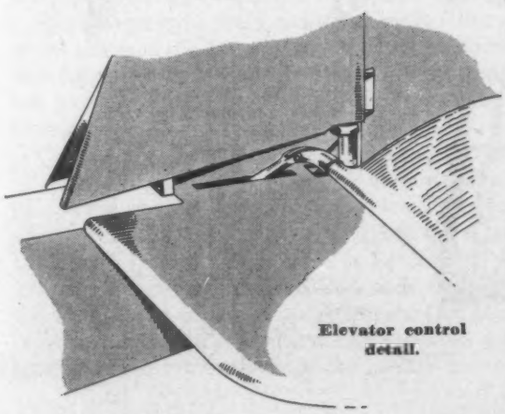
Two views of the interior showing the left front seat with the back up, and also folded down to form a couch.



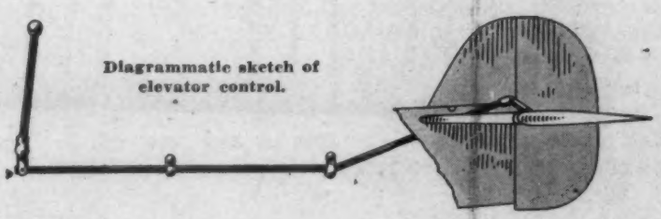
Sketch of the controls. The automotive tendency is shown in the floor board treatment.



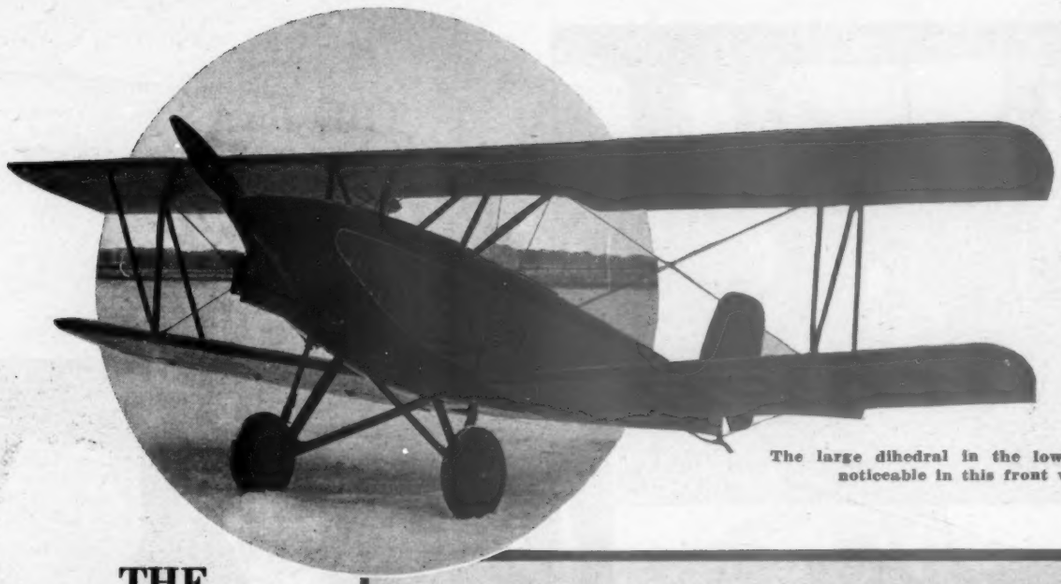
Quarter view of the standard plane.



Elevator control detail.

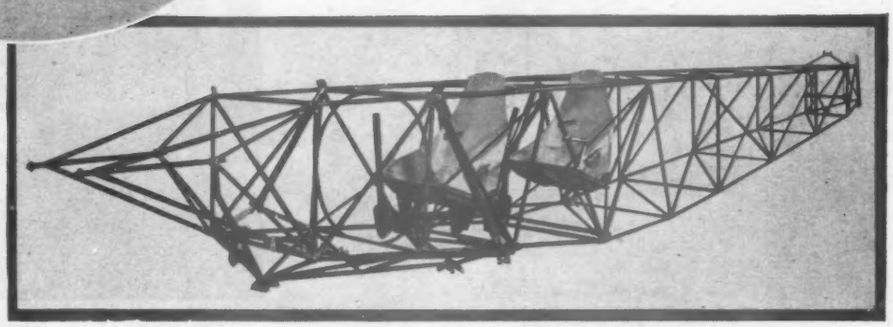


Diagrammatic sketch of elevator control.

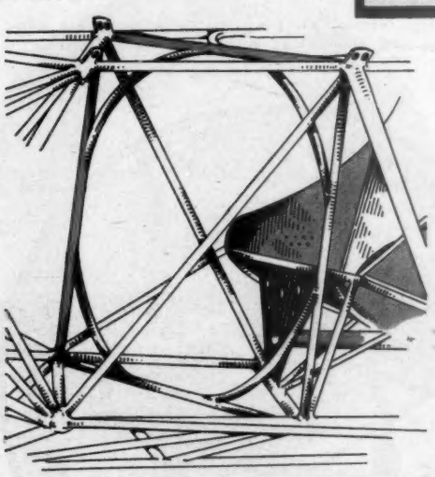


The large dihedral in the lower wing is noticeable in this front view

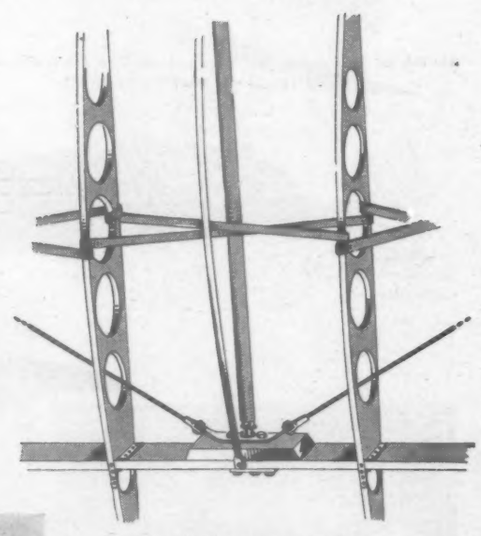
THE DRIGGS *"Skylark"*



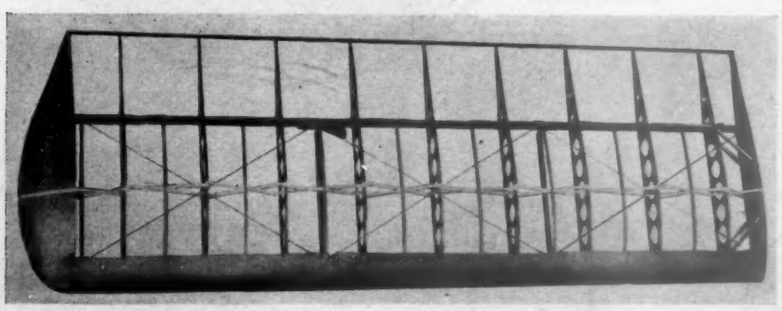
The welded steel tube fuselage with sets in place



Detail of interior bracing of the fuselage at the front cockpit. The elliptical tubing gives a clear space for all controls



Detail of wing construction. The fittings and the fabric supporters between the ribs are worthy of note.



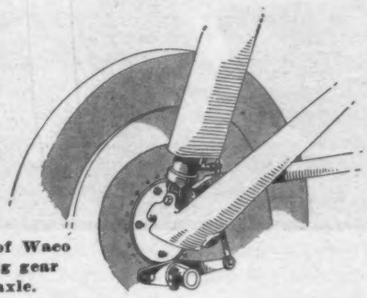
The uncovered wing.

notable case, that of the Fokker Universal, the center section transparent portion has been raised a few inches above the level of the upper surface of the wing and extended back considerably behind the cockpit affording unusual visibility above and to a certain extent behind.

Cleaner instrument boards and unit instrument panels are being used particularly in the so-called chummy types of cabin monoplanes and the number and disposition of control devices is being minimized in such a way as to present a less complicated appearance to the controls in the business and sporting type of plane. Rudder pedals are being used increasingly in this type and in fact in most types except the open biplane intended primarily for training. In the airplanes intended for private pilots, the left-hand throttle is being replaced by a throttle unit placed in the center of the instrument board and intended to be used by the occupants of either of the front seats. A greater number of airplanes are also being equipped with dual controls, one set of which can be disengaged by the person operating the other set in the event of cases of freezing to stick or jamming of rudder controls. Attention is being paid to the important problem of heating and ventilating as shown by the steam heating plant designed for the Curtiss "Condor" by the Foster, Verney Company, each of the two units of which weigh but 12 lb. and utilize continually six ounces of water.

There were relatively few N.A.C.A. cowling on airplanes exhibited at the show. More airplanes than at previous expositions were shown with interchangeable floats or skis.

Interchangeable ski equipment was shown on the Barling NB-3 plane exhibited in the Arena. These skis are constructed of wood and are attached to the axle by means of a truncated cone shape unit of laminated wood



Detail of Waco landing gear at axle.

bolted to the main portion of the ski and having a hole to take the axle. Shock cord is provided for the forward portion of the ski and stopping cables also are attached front and rear to arrest the travel of the ski about the axle. A wood tail ski is also provided that is easily interchangeable with the regular tail skid shoe of the plane.

The progress of metal construction is still apparent but wood remains the favored material for wing construction and fabric for covering. An interesting display of spruce cut to specification was shown by the Posey Manufacturing Co.

One of the most recent developments of the Curtiss-Wright Corporation was the Kingbird seven or eight place twin engined cabin plane, which attracted considerable attention at St. Louis. The Kingbird is a high wing, externally braced monoplane powered by two Wright Whirlwind engines mounted in outboard nacelles beneath the wing. The pilot sits in the immediate nose.

Behind the pilot's compartment are seats for five passengers and a removable seat for a sixth arranged in two rows with an aisle between. Further aft is a baggage compartment and a lavatory equipped with toilet and wash basin.

The passenger seats are reclining chairs, upholstered in leather, with high backs and box spring cushions. These chairs are the same as those used on the Curtiss Condor.

The cabin has large windows of non-shatterable glass. The walls are upholstered in leather up to the window

Hull construction detail of the Keystone Loening "Commuter"

line and in cloth above. Trimmings are in walnut. A carpet covers the floor.

Ventilation and steam heating are provided. The walls are insulated against cold and noise by a special material installed between the upholstery and outer covering.

The greater part of the Kingbird's structure is built of aluminum alloy but heat treated steel is used for the more heavily stressed members. The wing beams are dural tubes in the inner panels and welded steel tube trusses in the outer panels. Ribs are built up of dural tubes riveted together.

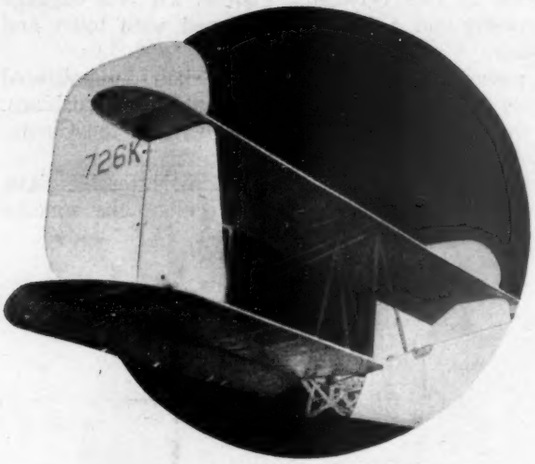
The fuselage structure is of aluminum alloy tubes riveted into duralumin or steel fittings at the junction points. The section including the cabin is covered with bakelite. A vertical fin and rudder is placed in the slipstream of each propeller. A rubber tired tail wheel is provided, and olea-and-spring shock absorbers are installed both on the landing gear and on the tail wheel.

IN THE CLASS of airplanes completed just in time for the show was the Ireland Privateer (M-1), a convertible flying boat or amphibion. This design is to be produced as a flying boat with the Le Blond 60, American Cirrus or Wright J6-5 engines or as an amphibion with the American Cirrus or Wright J6-5 engines. The resulting five models which are similar in dimensions have a weight range of 950 lb. to 1,673 lb. empty and a gross weight range of 1,265 lb. to 1,673 lb.

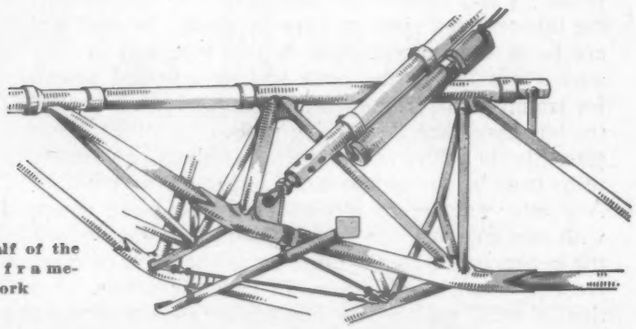
The Privateer is a two-place, externally braced, open monoplane with a pusher type engine installation, the engine being mounted on struts above the cockpit. The wing span is 36 ft. 8 in. and the chord 72 in. while the length is 26 ft. and the overall height 8 ft. 4 in. Dihedral is 5 deg., incidence 4 deg. and sweepback 4½ deg.

The wing has an area of 198 sq.ft. of which 29.3 sq.ft. constitute the aileron surface. The area of the fin

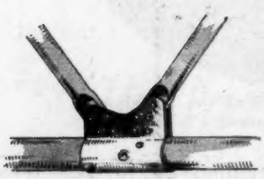
THE *Curtiss "Condor"* TRANSPORT



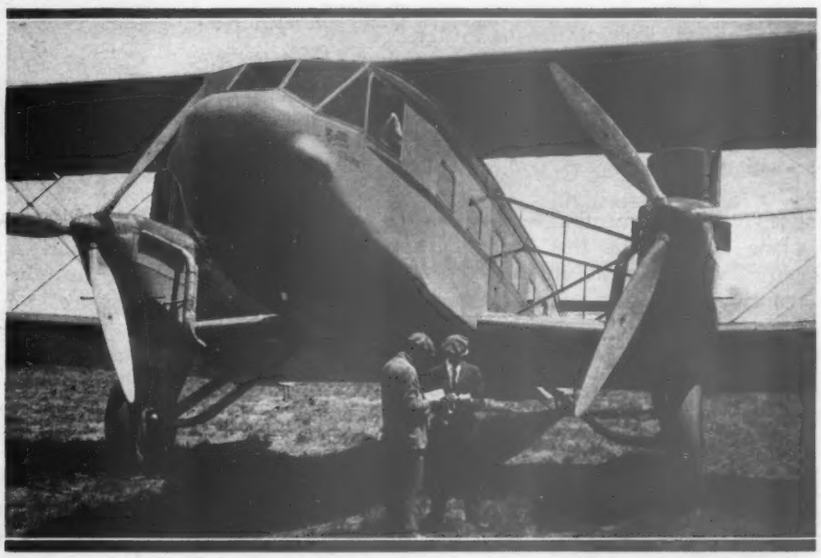
The rear elevator and rudders

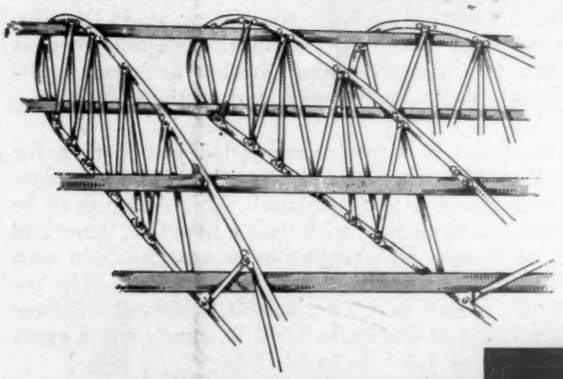


Left half of the engine framework

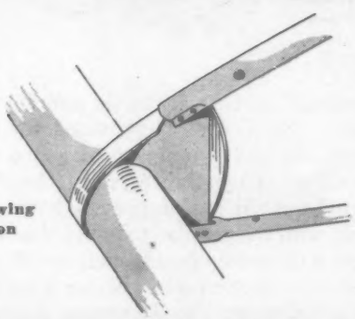


Detail of brace showing riveted construction

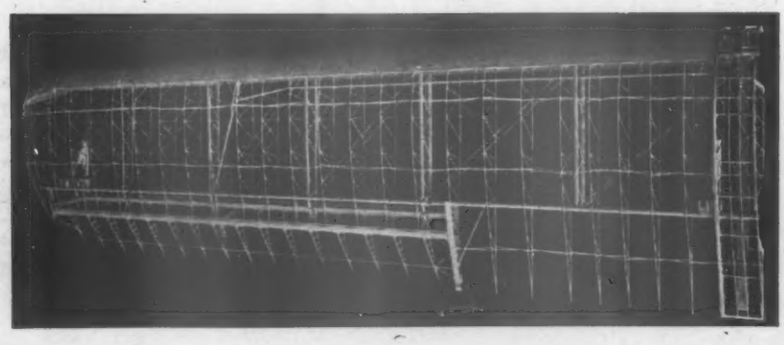




Wing ribs and tubular spars



Detail of wing construction



Completed wing ready to be covered

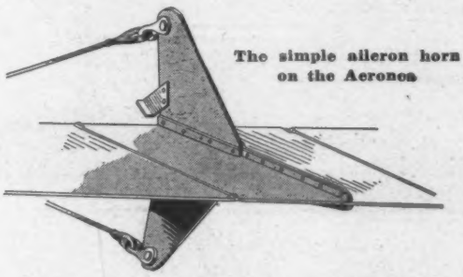
is 13.75 sq.ft. and of the rudder 11.7 sq.ft. while that of the stabilizer is 28.8 sq.ft. and the elevators 19.5 sq.ft.

Wood is used in the hull structure and Alclad is employed as sheathing. Spruce wing beams with steel ribs constitute the wing structure with spruce and plywood drag struts, while the covering is of fabric. The tail is attached to the hull by means of a single outrigger built up of welded chrome molybdenum steel tubing with fabric covering and triangular in section. Spruce beams and Alclad ribs with fabric covering are employed in the tail surface construction. Doughnut type of tires are optional for use with the retractable landing gear.

The Skylark, which was introduced at the St. Louis show by the Driggs Aircraft Corporation, is a small biplane of clean appearance using an inverted Rover Engine.

The wings are of wood and duraluminum construction and are fabric covered. The ailerons are of the Frise type and are made entirely of duralumin, being used on the lower wings only. Both cockpits are protected by large circular bands of steel for safety of the occupants.

The plane is designed for a useful load of 907 lb. and



The simple aileron horn on the Aeronca

a total weight of 1,371 lb. It has a wing area of 185.6 sq.ft. with a wing loading of 7.4 lb. per sq.ft. The engine develops 77.1 hp. at 1,975 r.p.m. giving a power loading of 17.8 lb. per hp. The span of the plane is 28 ft. 3 in. and it has a 22 ft. 8 in. length.

THE NEWLY INTRODUCED airplanes at St. Louis also included the Szekely SR-3 powered Baby Ace cabin monoplane developed by the Ace Aircraft Corporation of Wichita. This machine is a one passenger externally braced type, designed mainly for the accumulation of flying time toward transport license requirements. The wing has a span of 25 ft. 8 in., and a length of 17 ft. 5 in., and a gross weight of 800 lb. The wing loading is 7.4 lb. per hp. while the power loading is 20 lb. per hp. Other available power plants include the Salmson nine cylinder 40-hp. engine, the three cylinder Anzani, or the Le-Blond 60.

The Aeronautical Corporation of America exhibited its Aeronca at the St. Louis show. Powered with a two cylinder 30 hp. opposed engine of 4⅛ in. bore and 4 in. stroke, the plane was designed to carry one person but has been flown with two aboard. It is exceedingly low in price and has been designed for rapid production.

The engine was designed and will be built in the corporation's own factory. Jean A. Roche was the designer of both plane and engine.

Among the five airplanes exhibited by the American Eagle Aircraft Co., was the new four place monoplane with folding wings designed for the Wright J6-5 or J6-7 engines. One of the biplanes in this exhibit was powered with the new Kinner 190 hp. engine.

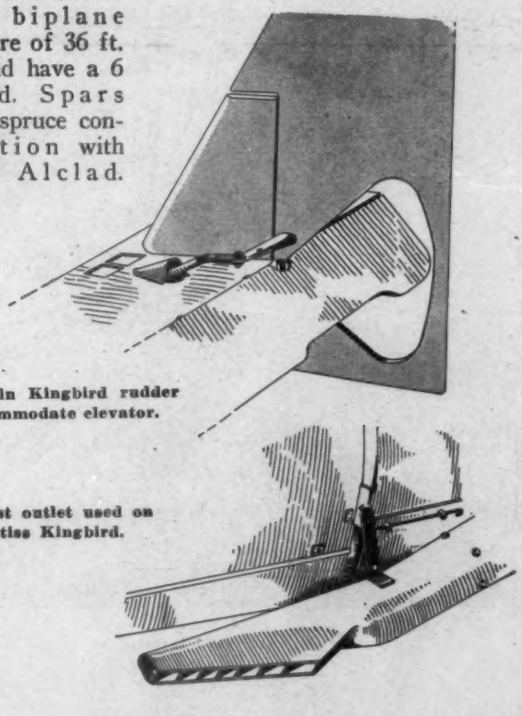
One of the late arrivals at the show was the Lenert biplane which is probably most adequately described by its advertising slogan "all metal but the tires." The Lenert is a three-place tandem cockpit, single bay biplane powered with the Continental A-70 engine. The fuselage structure is constructed of riveted open section aluminum alloy members and the skin is also of aluminum alloy, corrugated material being used on the sides and flat on the top and bottom. Wing structure is built up of aluminum alloy tube spars and ribs and the covering is flat sheet. It is interesting to note that, despite the metal construction, the gross weight is less than 2,000 lb.

FAIRCHILD'S EXHIBIT centered around the new "42. This plane, seating four, is a high wing, cabin monoplane. It is powered with the Wright J-6 engine. The wings are of the well known Fairchild folding type. The landing gear has a wide tread and skis or floats are quickly adaptable. The cabin is spacious and baggage compartment and toilet room are located in the tail.

Although it has been in production for some time, the Commuter, companion to the Keystone-Loening "Air Yacht," was among the new planes making their debut at the St. Louis show. More streamline than the average amphibion, it retains the rugged features of the "Air Yacht," an interesting new model of which was shown.

The frame work of the Commuter hull is built up of duralumin shapes bolted together. The skin is of sheet dural treated to prevent corrosive action. The skin is bolted to the frame, no rivets whatever being used in the hull's structure.

The biplane wings are of 36 ft. span and have a 6 ft. chord. Spars are of spruce construction with ribs of Alclad.



Cut out in Kingbird rudder to accommodate elevator.

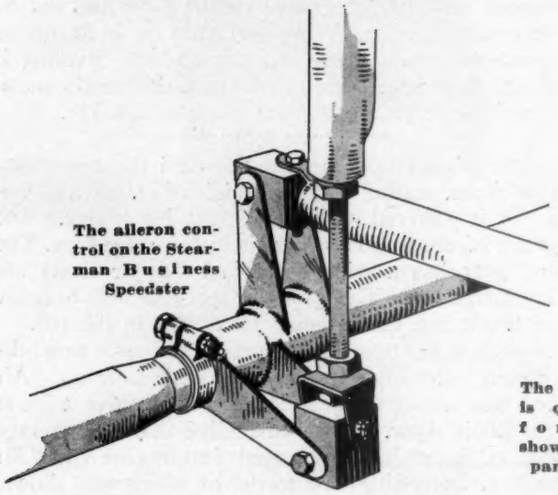
Exhaust outlet used on Curtiss Kingbird.

Wings and all control surfaces are fabric covered. The wheels are hydraulically raised or lowered by a small hand-operated lever pump. "Aerol" shock absorbers are used on both wheels and tail skid.

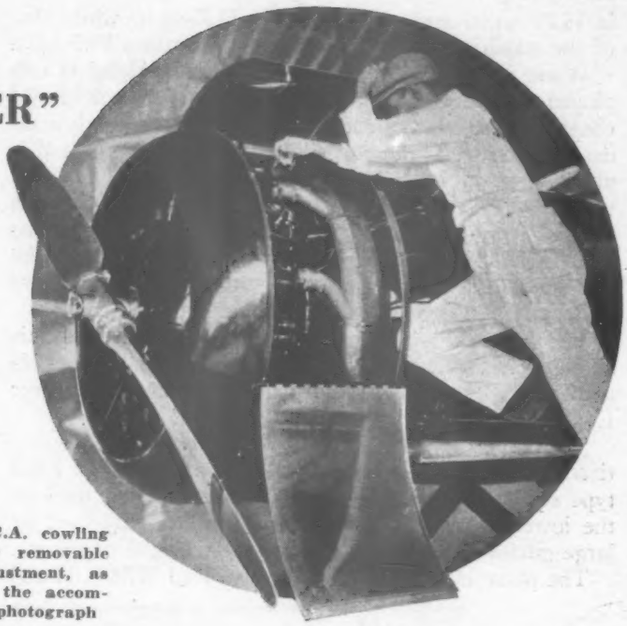
The plane seats four persons, the two front seats having complete dual control. In addition to the main hatch entering the cabin at the rear, a smaller hatch is provided at the front for convenience in picking up mooring lines and alighting at the dock.

The Commuter is powered with the J-6 300-hp. engine. The propeller is placed in such a position that no one need

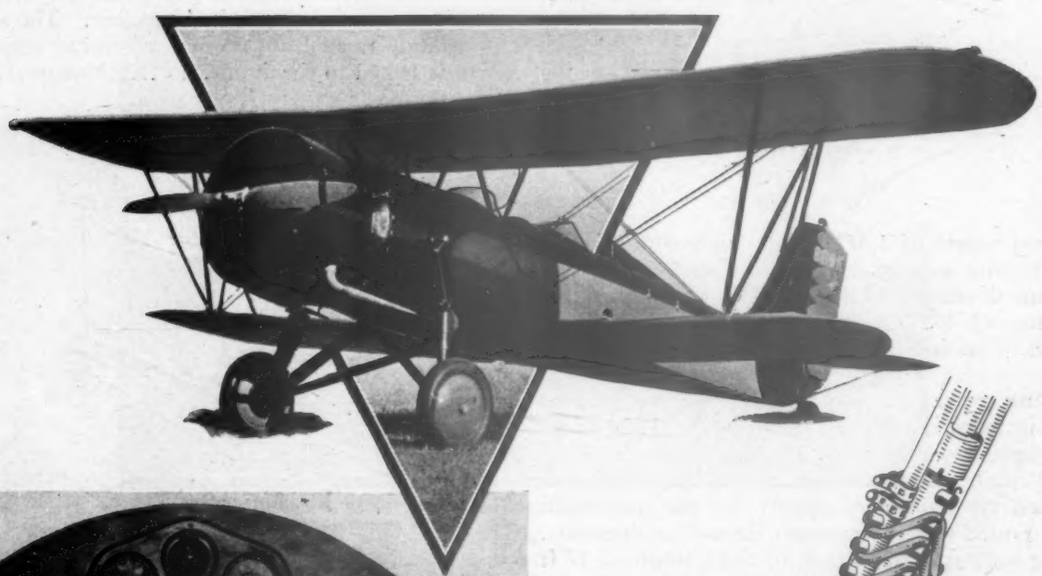
THE *Stearman*
"BUSINESS SPEEDSTER"

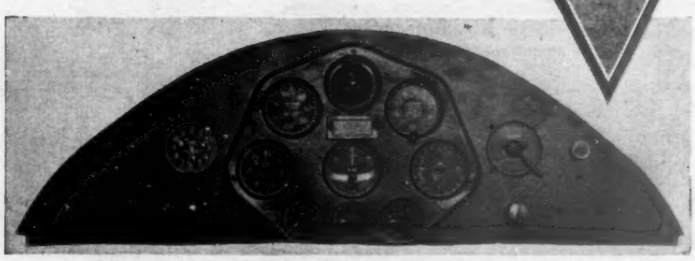


The aileron control on the Stearman Business Speedster

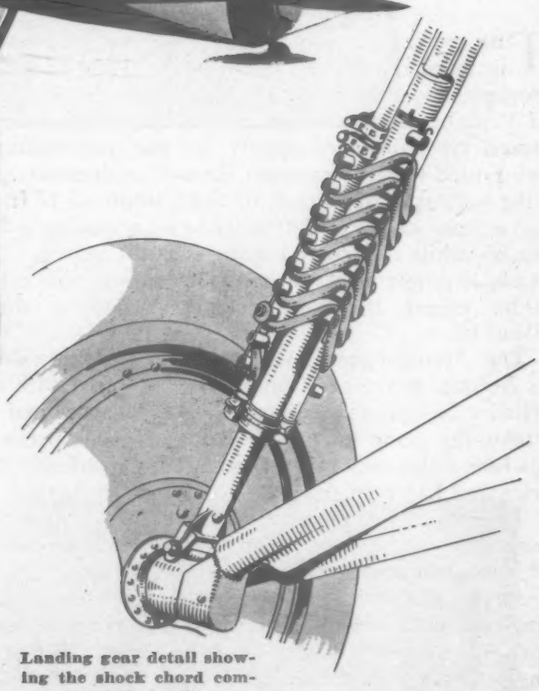


The N.A.C.A. cowling is quickly removable for adjustment, as shown in the accompanying photograph

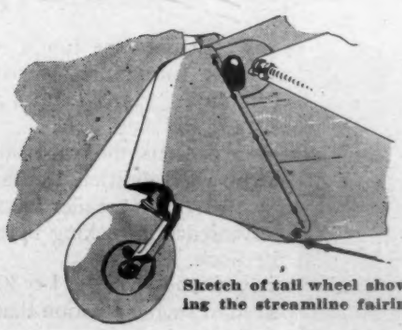




The standard instrument board

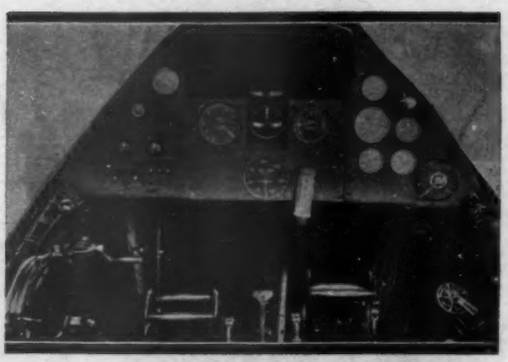


Landing gear detail showing the shock chord compression unit



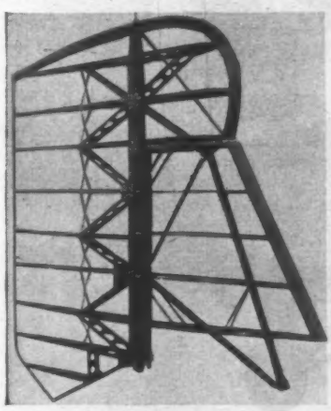
Sketch of tail wheel showing the streamline fairing

Interior of cockpit showing instrument panel

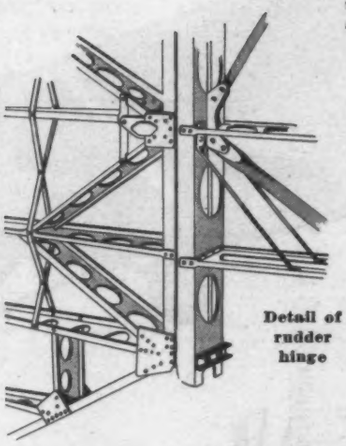


THE CURTISS *Carrier Pigeon*, II

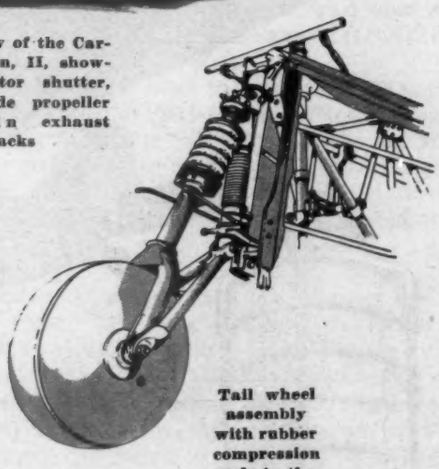
Front view of the Carrier Pigeon, II, showing radiator shutter, three blade propeller and twin exhaust stacks



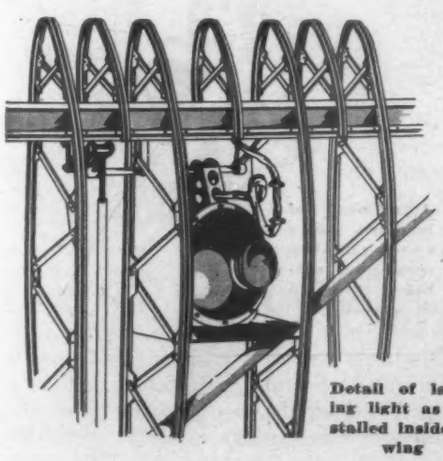
Rudder and fin assembly uncovered



Detail of rudder hinge

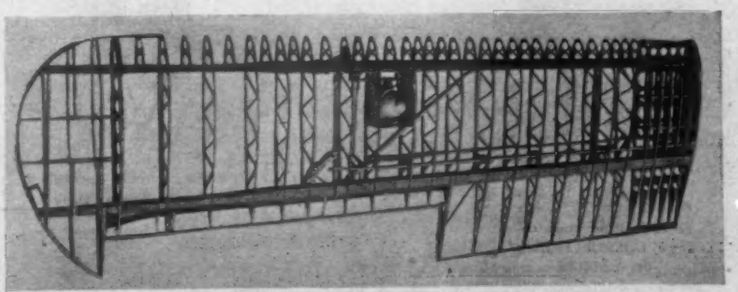


Tail wheel assembly with rubber compression pads in the shock unit

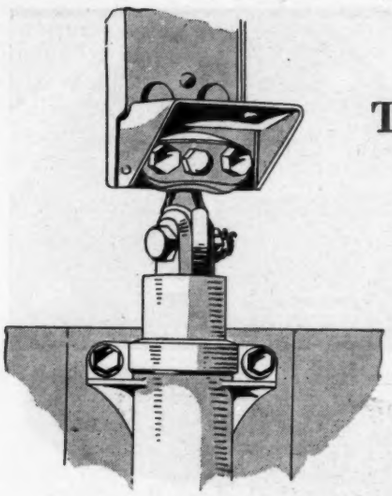


Detail of landing light as installed inside of wing

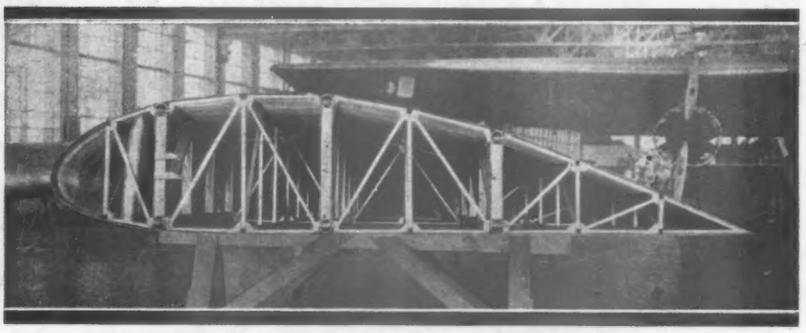
Uncovered wing assembly



THE *Ford* TRI-ENGINED MONOPLANE

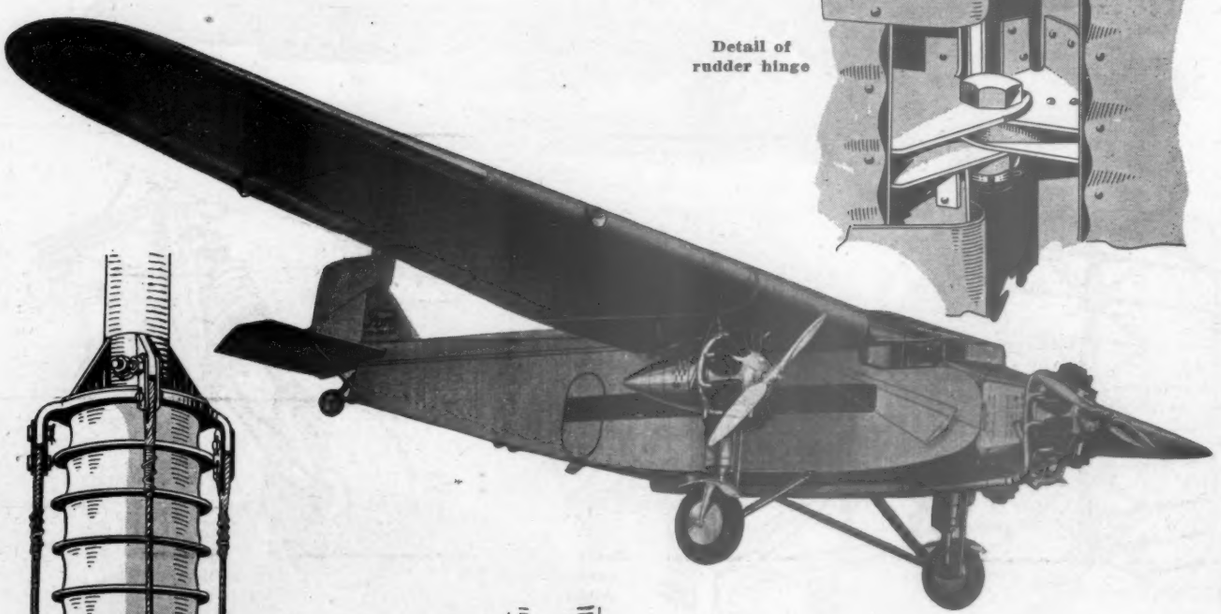


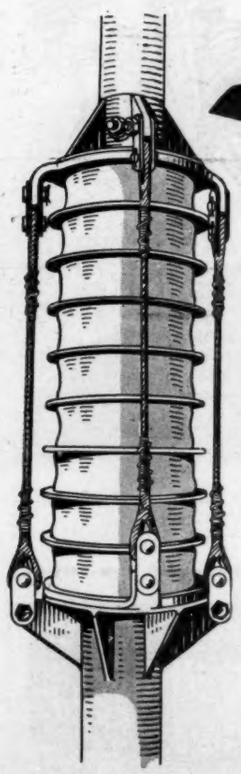
Sketch of stabilizer adjustment with telescopic tube



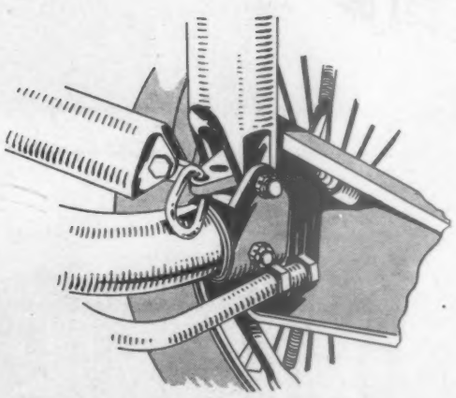
End view of wing showing interior construction

Detail of rudder hinge

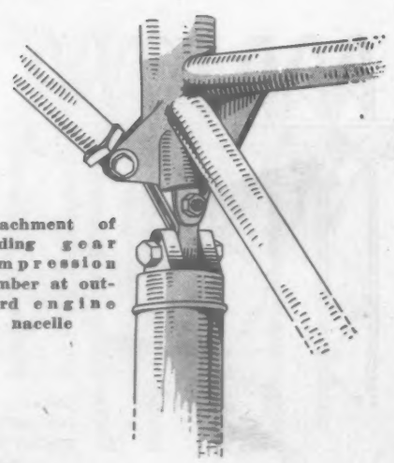




Shock unit with rubber disc mountings, rebound cables on outside



Axle, showing wheel mounting and hydraulic brake tube



Attachment of landing gear compression member at outboard engine nacelle

ever walk by it to get in or out of the cabin. Electric starter and primer are standard equipment.

REFINEMENT in the new model of Waco plane includes simplification of the external wing bracing and addition of internal drag bracing in the conventional manner. Skewed ailerons have been incorporated in this model necessitating a false spar for their mounting and giving the general appearance of tapered wing in the straight wing type. The new airplane embodies the use of a tail wheel to replace the skid in the previous model and the wheel may be locked when it is desired to use the airplane for training. The wheel also can be replaced by a skid and the mounting has 360 deg. castor action with a spring device for centering. The pyralin windshields, stretched by dies to the desired shape, are used in the new models and this process has been found successful.

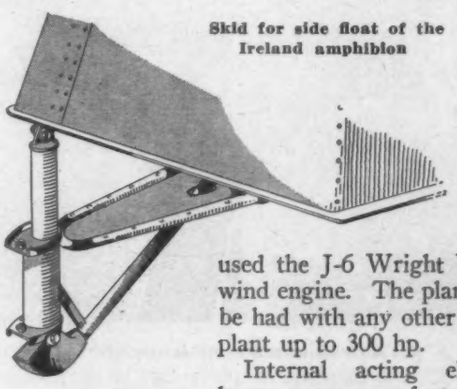
The Waco landing gear has been slightly modified in the new model and one of the members of the tripod structure eliminated. The present type has a vertical shock absorber strut, the upper end of which is welded to a short horizontal member which is in turn welded to the lower fuselage longeron. Another member welded to the upper longeron is attached by welding to the point of intersection of the vertical and the horizontal struts.

A feature of the Detroit Aircraft Corporation's exhibit was the unveiling of the new Ryan Foursome. This plane is built along the lines of their previous models and is powered with a Wright J6-7 engine.

The upholstery and seating arrangement are worthy of note. The back of the right front seat folds down joining the rear seat and forming a comfortable lounge on which the traveler may take a nap. All other seats are adjustable to several reclining positions. The upholstery and interior trim are made to match throughout.

No cables or other parts of the control mechanism appear above the floor. An auxiliary stick for instruction purposes may be inserted in a few minutes. The brake pedals are conveniently located just above the left seat rudder controls.

A departure from Ryan practice is that the wing is made in two panels and a small dihedral is used. Steel, cadmium plated ribs are used throughout with dural compression members. The model on display at St. Louis

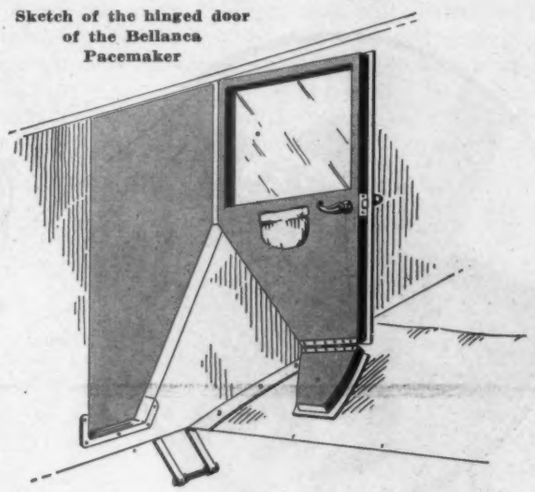


Skid for side float of the Ireland amphibion

used the J-6 Wright Whirlwind engine. The plane may be had with any other power plant up to 300 hp.

Internal acting elevator horns were new features of the Ryan monoplane and Eastman Flying Boat in the Detroit Aircraft Corporation. These horns are actuated by internal push tubes and when the elevators are in down position, the upper end of the horn moves into a recess in the lower portion of the vertical fin. This simplified arrangement eliminates drag producing and unsightly struts or cables and horns in the air stream.

Although not a new type, the Lockheed Sirius was displayed for the first time in the exhibit of the Detroit Aircraft Corporation. The Sirius has a structural resemblance to its predecessor the Lockheed Vega, but differs in that it is a low wing open monoplane, for two passengers in tandem speeding arrangement. Full advantage of the monocoque construction is taken to provide an unusually high degree of streamlining while wheel fairings and an N.A.C.A. cowling also contribute



Sketch of the hinged door of the Bellanca Pacemaker

to the aerodynamic efficiency. It has a wing span of 42 ft. and a length of 27 ft. The gross weight is 6,200 lb. and the total wing area is 265 sq.ft.

Those who planned the Fleet exhibit are to be commended on their method of presentation. An uncovered wing structure showing the ingenious aileron control. a landing gear unit showing the use of the air wheel, and a tail unit showing the simple stabilizer adjusting mechanism, were included in addition to the standard Kinner powered trainer shown.

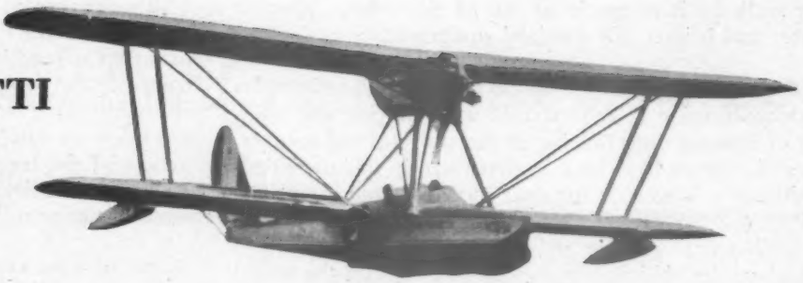
TWO NEW Stearman models had their premiere at the St. Louis show. The first of these, the Business Speedster, follows closely upon the C-3B with which the industry has become familiar. With the introduction of the new series of Wright engines Stearman engineers decided not only to replace the engine in the C-3B model, but also to revamp the design of the plane. The Business Speedster is the result. All the appointments of the plane have been very much improved. The display model of the Business Speedster which was shown at St. Louis had a fuselage painted in skyways green and the wings done in international orange, both colors being furnished by the American Varnish Company.

The newest member of the Stearman family, also shown for the first time at St. Louis, is the Junior Speed Mail. In general lines and appearance this plane follows the standard Stearman practice. The plane is equipped with N.A.C.A. cowling which was developed by Stearman engineers with insight into both maintenance and aerodynamic problems. The landing gear is of characteristic Stearman design but employing a hydraulic spring unit instead of the rubber disk type found on the C-3B. The tail wheel rotates through 360 deg.

In the pilot's cockpit controls are readily accessible and an indirectly lighted instrument panel is conveniently placed before him. The pilot's seat is adjustable.

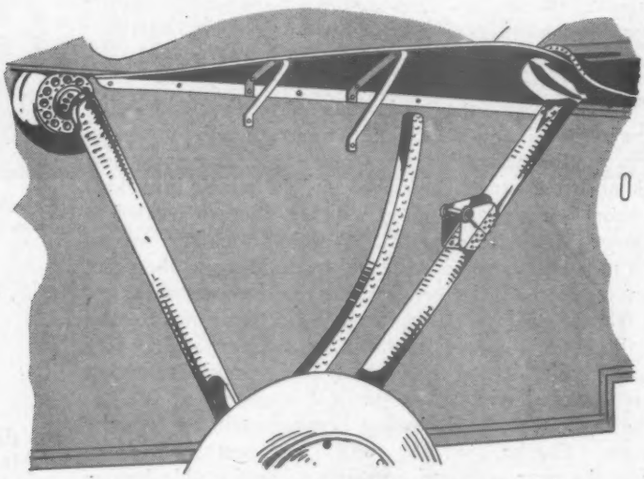
Two large baggage compartments are provided, allow-

SAVOIA-MARCHETTI *Amphibian*



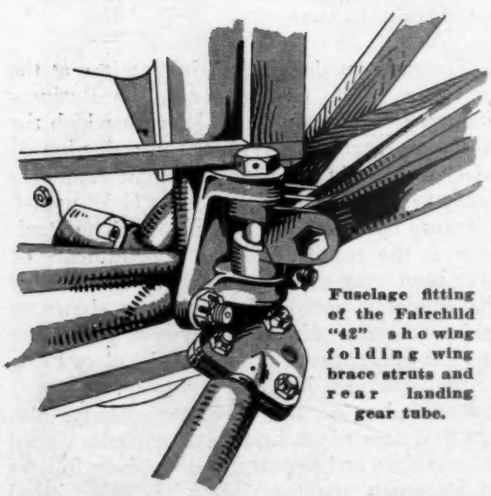
The Savoia-Marchetti with landing gear retracted.

Detail, showing engine mount faired into upper wing.

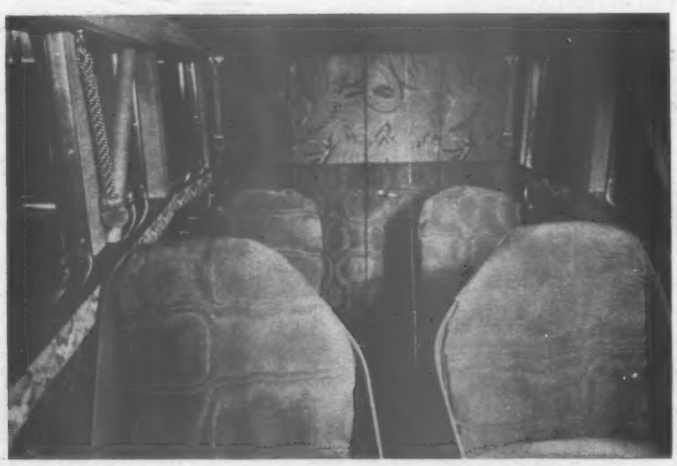


The wheel raising mechanism showing hinged member and the guide slide.

THE *Fairchild "42"*



Fuselage fitting of the Fairchild "42" showing folding wing brace struts and rear landing gear tube.



The interior of the cabin of the "42"

The Fairchild "42"

ing a pay load of approximately 750 lb. to be carried. A removable metal plate on the underside of the fuselage provides ready accessibility to all controls for inspection. The Speed Mail on display had for a color scheme Berry Bros. yellow, blue and black with silver striping.

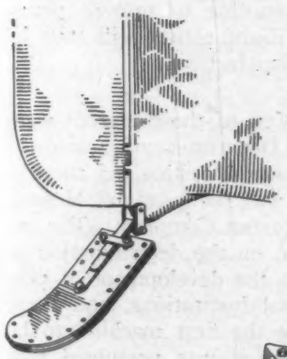
The Business Speedster has an overall span of 35 ft. as compared to the 38 ft. span of the Junior Speed Mail. The wing area of the Business Speedster is 288 sq.ft. while that of the Speed Mail is 307 sq.ft. The Junior Speed Mail will be produced in two models. The C4A will be powered with a Wright Whirlwind while the C4W will be powered with a Pratt & Whitney Wasp. The gross weight of the Business Speedster is 2,700 lb., that of the Junior Speed Mail being 3,800 lb. and 3,900 lb., respectively, for the two different engines.

Four new models, all of the enclosed cabin type were announced by Stinson as their 1930 offering.

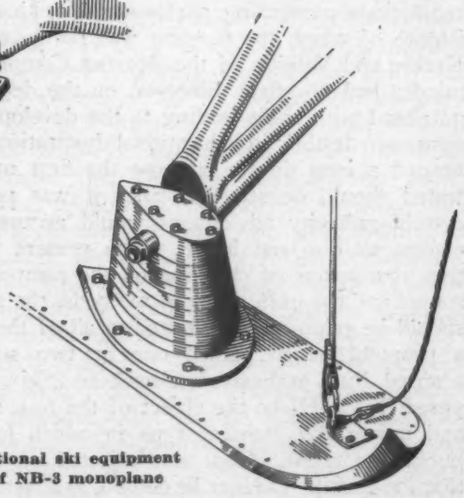
Three models of the Stinson-Detroiter Junior four-place cabin plane were shown, the feature model being equipped with a 210-hp. Lycoming engine. This engine, known as the R-680, is now in production, after having been under development for more than two years by the Lycoming Manufacturing Company of Williamsport, Pennsylvania. One of these models was equipped with a 225-hp. Wright engine and the third with a 300-hp. Wright. In construction, the plane is a duplication of the 1929 Stinson Junior.

Two models of the Stinson-Detroiter Senior type were shown. One was a six-place cabin plane, equipped with a 300-hp. Wright engine and the other an eight-place cabin type with a 425-hp. Pratt & Whitney Wasp.

The latest model Verville air coach was exhibited and was as usual outstanding for its beautiful finish. Sev-



Sketch showing tail ski of the Barling NB-3

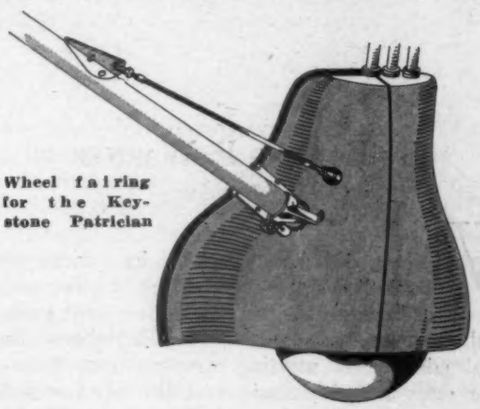


Optional ski equipment of NB-3 monoplane

eral additions have been made to its equipment since the last showing. These include retractable landing lights in the lower surface of the wing, an optional electric or air starter, and a trunk situated in the rear of the cabin.

THE LARGEST PLANE of the Curtiss-Wright exhibit was the Curtiss Condor and it attracted attention proportionate to its size. The plane is powered with two Curtiss Conqueror B-1570 water-cooled engines of 635 hp. each. The engines are geared at the ratio of 2:1, giving a propeller speed of 1,200 r.p.m. The plane is of the biplane type. The interior of the cabin is divided into three compartments, each compartment accommodating six passengers and if desired it may be completely shut off from the other two by means of doors. The interior finish resembles wood paneling and is very attractive. Exceptional precautions have been taken in the construction of this plane to dampen the noise of the engine. Accessories which may be included at the option of the operating company are four sleeping berths, full pullman equipment for night flying, a desk seat, buffet, and a refrigerating system. A greatly improved seating arrangement was embodied in the Condor shown at St. Louis.

Pilots enter their forward compartment through a door in the floor and without passing through the pas-



Wheel fairing for the Keystone Patrician

senger cabin. The ladder for this entrance folds back over the plane when not in use. Full two-way radio communication is provided on the plane.

In the Curtiss-Wright exhibit was also included the Carrier Pigeon II. This plane was designed to carry large loads at high speed with little, if any, increase in the size of the power plant. The plane uses a geared Curtiss Conqueror engine. The lines of the plane are very clean and it is very well streamlined.

The Conqueror engine, a twelve-cylinder power plant, develops more than 600 hp. It is connected by a two-to-one reduction gearing to a Curtiss-Reed metal propeller having three adjustable blades. The engine and radiator are completely coweled in, and the lines of the cowling blend perfectly into the fuselage.

To further the aerodynamic efficiency of the plane the landing lights have been made retractable. The navigation lights are built into the wing tips, and the tail wheel and its strut are enclosed in a sheet metal fairing.

The Carrier Pigeon II is a single bay, unequal span, staggered biplane. The top wing is considerably forward of the lower wing and is slightly larger. The fuselage is of the semi-monocoque type in the mail compartment section, with the skin of the fuselage built to carry a part of the load. The mail compartment, which has a capacity of 125 cu.ft., is free of bracing and is made entirely of metal. To facilitate the replacement of parts of the fuselage, it is constructed in three sections, built separately and bolted together.

The pilot can make three adjustments of his seat in flight, moving himself toward or away from the rudder pedals as he desires; raising or lowering the seat 10 in., and adjusting the angle of inclination of the seat back. By means of a hand lever, the rudder pedals may be made to operate both the rudder and wheel brakes or the rudder only.

FROM Export Codes

A Review of the Meetings of the Airplane and Engine Sections in

By EDWARD P. WARNER
Editor of AVIATION

WITH a dozen meetings of its various sections planned for the week in St. Louis, and with the program having also to provide for joint gatherings with the Society of Automotive Engineers, for the national educational meeting running over three days, and for daily sales discussions at the St. Louis Arena, the Aeronautical Chamber of Commerce filled every available hour with its scheduled activities. The meetings were on the whole better attended than ever before. They were on the whole productive of more serious, intelligent, and useful discussions than in the past. The attitude of those in attendance symbolized an increasing interest in cooperative work within the industry, which was emphasized in the report, made to the commercial manufacturers' session by General Manager Luther K. Bell, that only two substantial builders of airplanes are at present outside the Chamber's membership.

The meeting of the commercial manufacturers opened the week, with forty-five men in attendance and with some sixteen companies represented. In accordance with established precedent, J. Don Alexander presided, and he was re-elected as chairman for the coming year as the first formal business of the meeting. The section voted to increase its executive committee from seven to nine in number, adding two members at large to assist the geographical representatives, and there were selected as Mr. Alexander's colleagues for 1930: Richard H. Depew, Fairchild, northeastern section; R. B. C. Noorduyn, Bellanca, southeast; C. J. Brukner, Waco, east central; J. C. Nulsen, Detroit Aircraft, north central; Lloyd Stearman, Stearman, south central; C. N. Monteith, Boeing, northwest; E. A. Stinson, Stinson, and Walter H. Beech, Curtiss-Wright, members at large. Mr. Alexander himself will represent the southwestern section. It is worthy of note that at least five of the nine members represent companies dealing entirely with individual purchasers, never having sold a plane to the government and having none of their products used on transport lines. Only one of the nine could be considered as having any very substantial military interest. Two other officials of companies largely concerned in military production were among the thirteen nominees for the nine positions, but failed of election.

Formalities out of the way, the first real discussion turned upon standard performance testing procedure. The report of the committee on that subject being presented by Mr. Edwards in the absence of the chairman, Professor Alexander Klemin. Eight universities have been picked by the committee as qualified to make standard tests, and trials of the proposed standard procedure will be undertaken in the immediate future. One plane will first be tested by one of the eight institutions selected. Applications of the same methods by each of the other institutions will, according to present plans, be made shortly thereafter. Eight planes will thus be tested free of charge to the manufacturers.

IT DEVELOPED that only very few of those present were acquainted with the present Department of Commerce regulations concerning performance testing, of the existence of which the meeting was reminded by Messrs. Kerber and Willitts of the Spartan Company. The reminder had no effect, however, on the determination to go ahead with trials leading to the development of performance testing in educational institutions, and there ensued a long debate on how the first machine to be tested should be selected, since it was presumed that certain publicity advantages would accrue to the type chosen as the trial horse. The present writer urged that as a means of checking on the competence of personnel and the uniformity of methods, the same machine should be submitted and tested at all of the universities, a proposal which gained one or two supporters but aroused little enthusiasm elsewhere. Mr. Cessna proposed that a JN be the object of the test, as a standard and universally familiar type in which no one had a publicity interest. That was rejected, as was a motion that the Curtiss Tanager be chosen, as a nationally known model upon which elaborate trials had already been made and would be available for comparison. It was finally decided that the selection of the planes for test should be made by lot.

The usual discussion of airworthiness requirements and of Department of Commerce procedure, preparatory to the meeting with the officials to the Aeronautics Branch later in the week, brought out fewer serious complaints than had been presented in a number of past Chamber of Commerce gatherings. Some points pertaining to stress analysis were presented and inconclusively discussed, their very complexity making it

TO Spinning Rules

the Aeronautical Chamber of Commerce at the St. Louis Arena

impossible to undertake any complete analysis or completely to understand, on the spur of the moment, just what was involved. As at Cleveland last fall, the spinning regulations were the subject of much discussion, but no definite decision to seek modification was arrived at. The discussion took a less technical turn than at Cleveland, as most of those present were general executives of their companies, only a very few of the chief engineers being on hand.

The airplane manufacturers had on their agenda a number of commercial subjects intermingled with the technical ones. In particular, they discussed the proper form of the Chamber's production report and the possible advisability of supplying data on sales along with those on production, as is proposed in the monthly reports now being collected. The chief thing developing from that part of the program was an evidence of a rather general misunderstanding of the weekly and quarterly license lists now issued by the Aeronautical Chamber of Commerce, which were variously attributed by members in attendance to the Department of Commerce itself and to a commercial organization in New York, and which finally had to be explained in detail by Mr. Brattain, the Chamber's Washington representative. The proposal of taking a periodic sales census brought out marked differences of opinion upon the definition of a sale and upon the relative significance to such a census of sales to ultimate consumers, sales to dealers, and simple transfers of finished airplanes from a production unit to a sales corporation under the same financial control. So far as any general sentiment was manifest, it favored collecting data on actual sales to the ultimate user, but no effective means of wholly overcoming the admitted difficulties in the way of getting full information on the last stage of distribution was submitted.

THE PRODUCTION reports and the compilation of license data are aimed to assist in scheduling production and avoiding either over-supply or under-supply of the market. To aid in picking up the pieces, and in such salvage as possible, when there has actually been an over-supply or when sudden changes have to be made from an old to a new model, the chairman brought up the proposal of a purchasing agents' conference, to exchange information on the economical purchase of experimental material in small lots and to provide a clearing house for accumulated surplus. It was formally voted that such a conference should be held annually, with the first meeting at the coming Detroit show, and it was further agreed that the facilities of the Chamber of Commerce can be used to exchange information of surplus stock on hand, each manufacturer notifying the Chamber of material of which he may wish to dispose. The information so received will, of course, be arranged in standard form and broadcast to the membership.

A large part of the afternoon was devoted by the airplane manufacturers to hearing and discussing a sales

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Planes and Engines

UDBYP .....And WING (S)
UDCAN .....Biplane wings
UDCEU .....Front wing bolt (s)
UDCHY .....Front wing hinge (s)
UDCIZ .....Front wing strap (s)
UDCKA .....Full cantilever wing (s)
UDCOE .....High wing (s)
UDCSI .....In wing (s)
UDCUK .....Left lower wing (s)
UDCYO...Left lower wing (s) (....) covered and (....) painted
UDDAP.....Left lower wing cover (s)
UDDET .....Left upper wing (s)
UDDHU ...Left upper wing (s) (...) covered and (...) painted
UDDIY .....Left upper wing fabric covering
UDDLA .....Low wing (s)
UDDOD .....Lower left inner wing (s)
UDDPE .....Lower right inner wing (s)
UDDTI .....Lower left outer wing (s)
UDDUJ .....Lower right outer wing (s)
UDDYN .....Lower left wing
UDDZO .....Lower right wing
UDEAO .....Lower wing area
UDEBP....Lower wing area, including ailerons .... square feet
UDETH..Right lower wing (s) (....) covered and (....) painted
UDEUI .....Right upper wing (s)
UDEVJ..Right upper wing (s) (....) covered and (....) painted
UDEWK .....Semi cantilever wings
UDEXL .....Sesqui-plane wings
UDEYM .....Straight wing (s)
UDEZN .....Sweep back in upper outer wing only
UDFBO .....Tapered wing (s)
UDFGU .....Total wing area
UDFIW .....Total wing area .... square feet
UDFKY .....Upper center wing
UDFNA .....Upper left wing
UDFRE .....Upper right wing
UDFUH .....Upper outer wing (s)
UDFVI .....Upper wing area
UDFYL.....Upper wing area, including ailerons .... square feet
UDGAL .....Upper wing, complete, less ailerons
UDGDO .....Upper wing, complete with aileron

A section from the new cable code for exporters

promotion plan developed by the Lincoln Aircraft Corporation and presented by L. C. Perkins of that organization. Starting from the premises that the industry is over-organized, with too much capital per airplane and too few planes per airport, and that the general public has not yet genuinely accepted flying, Mr. Perkins looked for the reasons and found them in fear and in mistaken beliefs that flying is very costly, that it takes a long time to learn the art, and that only a man of extraordinary qualities can hope to practice it successfully. Indirect causes have been the failure of airplane dealers to follow confidence-inspiring tactics and the unfortunate fondness of many of them for sensational exhibitions which give aviation the worst possible publicity. The future, he believed, would depend upon business men outside of the industry more than on the technical personnel inside. They can be attracted by taking the mystery out of flying and by reaching them through leaders in their community, men in whom they would have confidence. Mr. Perkins was sure that a plane could be sold to at least one out of every five hundred automobile owners. That alone would insure some sixty thousand sales in the United States. Taking automobile ownership as the basis, therefore, he believed very strongly in the desirability of coupling the sale of airplanes with that of automobiles. The overhead of the airplane agency could thus be eliminated, while the airplane would benefit the automobile dealer by giving him favorable publicity and by attracting new groups of visitors to his show-room. In addition to the direct return from the sale of airplanes, his business in passenger cars should also profit.

POINTING OUT that there were over 53,000 automobile dealers in the United States and that their potentialities as a channel of airplane distribution had hardly as yet been touched, Mr. Perkins explained at length the educational and selling campaign planned by his company for reaching that group and for showing them how they could make a profit out of adding a line of airplanes to their present interest, and how they could at the same time keep practically all their capital liquid, as pilot-salesmen-instructors would work on commission and drawing account.

Mr. Perkins' suggestions were received with great interest and warmly discussed. Some possible difficulties were uncovered. It was reported for example that several of the largest automobile companies have specifically notified all their dealers they are prohibited from engaging in the airplane business, either because they object to dispersion of effort or because they want to hold the dealers in line for their own possible future airplane activities. Mr. Perkins' talk led off into a general discussion in which S. L. Willitts, of the Spartan company, Richard H. Depew of Fairchild, L. A. Nixon of Air Transportation, and the writer were leading participants. Solemn warnings were voiced against the apparently impending danger of a price war and also against high pressure selling methods, foisting planes on purchasers who have no real use for them and from whose hands they would speedily flow back onto the used-plane market. The manufacturer, said Mr. Depew, must continue his interest in the purchaser and in the service that the purchaser gets from the plane, and must coach him on how to get the most out of it. Another suggestion very favorably received, although not actually voted upon, was that there be formed a protective vigilance committee to work upon the press, not to suppress facts but to insure against unfair speculation or inference as well as against positive misstatement. Although this scheme was well received as a whole, there were other participants in the discussion who were prompt to urge that the aircraft industry's troubles began at home and that a vigilance committee should turn its light inward as well as upon the daily press.

S. L. Willitts

R. E. Lees, Sales Manager of Waco, in connection with this general exchange of views on merchandising, urged that the industry should be clear in its own mind on just what it is selling, and on how easy it is to fly. He particularly regretted the present impossibility, under Department of Commerce regulations, of allowing the prospective customer even to handle a dual control and see what it is like on a trial flight unless he has first had a physical examination and secured a student's permit.

Mr. Perkins also presented his plan to the engine manufacturers, from whom it evoked on the whole a more warmly sympathetic response than from the airplane group, notwithstanding the fact that his particular application of his scheme was focused on pushing the sales of OX5 ships. The representatives of the engine builders displayed great confidence that private ownership could be much extended by proper selling methods, and examples were cited of dealers and small manufacturers who had been especially successful in developing that market not only because of their great personal skill as salesmen but also because, following the line of Mr. Perkins' thought, they possessed the genuine confidence of their communities as solid and sober business men.

Merchandising of airplanes abroad was apparently of less lively interest than that at home, for the report of the export committee was accepted with but little discussion. A standard foreign distributors' agreement has been prepared as the result of some months' experience with a tentative form. A very detailed cable code, containing some forty thousand items, is nearing completion.

An exhaustive hand-book on aeronautical export practice, containing detailed accounts of the economic status, the aeronautical organization, and the general flying conditions and aircraft markets in all the countries of the world is underway, with the cooperation of the Aeronautics Trade Division of the Department of Commerce.

THE ENGINE manufacturers' section, like the others which had their meetings in St. Louis, had a chairman and an executive committee to elect. Like the airplane manufacturers, they re-elected their present chairman, Frank H. Russell of the Curtiss Company. The other members chosen for the executive committee were W. H. Beal of Lycoming, Robert Insley of Continental, C. W. Deeds of Pratt and Whitney, Fred A. Worthey of Axelson, D. L. Brown of Pratt and Whitney and C. L. Lawrance of Curtiss-Wright.

The engine manufacturers' discussions naturally largely paralleled those of the airplane builders. The meeting

was strongly favorable to a continuance of the newly established policy of collecting monthly reports and making them include both production and sales data. There were, however, a few protests that production figures would be redundant, and that only sales were interesting. One or two speakers with previous contacts with the automobile industry went so far as to urge that the present rule of pooling all reports in the offices of the Chamber of Commerce, and distributing only total figures, should be abandoned in favor of the practice of the National Automobile Chamber of Commerce, which receives sworn statements of sales from each of its members each month and distributes to them a table of sales made by each company with the understanding that the information so furnished will be held absolutely confidential.

The perennial topic of discounts and engine service played, as usual, a leading part in the discussion, and followed lines which have almost become traditional. Again there was argued the question of who will be responsible for the servicing of engines, of whether the airplane manufacturers can, through his local distributors, undertake that task or whether the engine manufacturer must designate his own service stations. Again there was debate on the relative discounts which should be offered on spare parts to engine distributors, to local dealers or sub-dealers carrying only a very small stock, to airplane manufacturers, and to operators doing their own servicing and buying parts in large quantity. The prevailing sentiment of the engine manufacturers seemed to be that at the present time there was not, with rare exceptions, enough business for any one type of engine in any one type of airplane in any one locality to justify the airplane dealer in preparing to give proper engine service. While the engine builders have no inherent longing to be charged with the maintenance of service, they feel that they must undertake it under present conditions, if a properly efficient and national service organization is to exist.

Col. Halsey Dunwoody, who contributed to the Chamber's air transport discussion

There is no general agreement among the airplane manufacturers on what discount they should receive on engines. They, of course, absorb the vast majority, perhaps ninety to ninety-five per cent, of the total engine output. The representatives of one engine manufacturer proposed that, in accordance with the usual practice is supplying proprietary engines in the automobile industry, there should be no question of discount at all because there should be no list price on the engine. The only figure involved would be the net price of the sale of the engine to the airplane manufacturer, and that would be separately negotiated in each case, depending upon the quantity taken, the time at which deliveries would be accepted, the willingness of the airplane builder to give a firm order extending well into the future, and so forth. That, however, would leave indeterminate the price at which complete engines would be sold, either by the engine manufacturer or by the airplane company acting as his agent, to the ultimate consumer who wants a spare or a replacement for his plane.

Like the airplane manufacturers, the engine section found little ground for serious complaint in their present relations with the Department of Commerce. The overspeed regulations, upon which some heat had been developed at the Cleveland meeting, went by without remark. Only one definite resolution was passed, to renew requests already made that the Aeronautics Branch should sanction the making of dynamometer tests for approved type certificates in the manufacturer's own plant, rather than at the Bureau of Standards, with the proviso that the testing equipment shall be satisfactory to the Department's technical personnel.

THE JOINT ASSEMBLY of the representatives of the aircraft industry with Secretary Young and other officials of the Department of Commerce violated a precedent. For the first time in several such meetings, the spinning regulations were not the principal topic of discussion. They were not, in fact, mentioned at all except in connection with gliders, and it was the general question of glider regulation and licensing that succeeded them in the first rank as a bone of controversy.

Clyde V. Cessna, one of the several airplane manufacturers who have taken up the commercial building of gliders, precipitated the debate by expressing the hope that Secretary Young would find, and fully avail himself of, means of preventing the towing of gliders behind airplanes. He thought it dangerous. He thought it bad publicity for the glider movement, a movement which could be of the greatest service to aviation if properly handled. He was unqualifiedly opposed to airplane towing, at all times and under all circumstances. Mr. Cessna's opposition deserved special weight, as members of the gathering with experience in gliding realized, because he comes from a very flat section of the country, where it is difficult to make shock-cord-launched glides of any considerable duration and where the temptation to engage in all forms of towed flight is correspondingly strong.

For Mr. Cessna's plea there was almost unanimous support. Airplane towing had no one to say a word in its behalf, except for one suggestion that it might be well to permit its experimental continuance under proper regulation in view of its possible commercial utility at some indefinite future date as a means of dropping loads in flight.

From airplane-towed flight the meeting drifted onto glider regulation in general. Although they were not very sharply and explicitly voiced, it was evident that two schools of thought existed. One group would keep glider construction, like airplane construction, in factories, and felt no sympathy for the individual commonly referred to as a "backyard builder." The other recognized the stimulation of engineering initiative as one of the glider's merits, and would encourage amateur design and construction so far as could be made consonant with safety. As one speaker put it, "the most essential thing is to find out whether or not the glider builder really knows what airplane construction is like and what precautions should be taken. If he knows that, the chances of his building a ship unsafe in ordinary glider practice, providing he works from approved blue-prints or from a properly computed design of his own, are small. Whether or not he knows can ordinarily be determined in a five-minute inspection of the completed machine." Several other participants in the discussion voiced kin-

dred hopes for a very lenient type of inspection and control, but there was general agreement on the desirability of some sort of supervision. Mr. Hartson, of the Comet Engine Co., believed that natural caution and the universal desire not to get hurt would prove sufficient safeguards, but his optimism found few echoes. It was suggested by several speakers, and seemed to be accepted by all as a reasonable first step, that the Department of Commerce should prepare an advisory code of desirable rules and precautions in glider design, construction, and operation, and that it should be distributed as widely as possible, with the moral support of the Chamber of Commerce and presumably through the National Glider Association as the active agent of distribution. Lew R. Palmer, of the National Safety Council, assured the meeting that the cooperation of the Boy Scouts of America could be counted on.

In summarizing the Department's problems in the glider field, Secretary Young had emphasized the need of some standardized method of dealing with the mail-order design. Certificates of approval might be issued for the drawings, but when blue-prints had been sold to a hundred amateurs all over the country it was impossible to be sure either that they would follow the prints rigorously or that their materials and workmanship would be up to the required standard. He expressed, however, no active dissent from the view that a casual inspection of the finished product would be a great, and a sufficient safeguard.

GLIDERS, in turn, led the talk on to the control of the amateur pilot of power planes. Charles L. Lawrence, of Curtiss-Wright, very straightforwardly declared himself opposed to physical examinations for private pilots. His words were received with prolonged applause, and introduced a debate in which the existing student permit regulations, and the necessity of having a physical examination and a permit before touching the controls of a plane, even as a prospective customer taking a demonstration or as the plane's owner riding beside the professional pilot, played a large part.

The usefulness of the discussion was somewhat reduced by the fact that several of the speakers were palpably unfamiliar with existing conditions. One or two, for example, believed that the examination for a student permit was now the same as for a transport license. Even putting those miscomprehensions aside, however, a very pronounced sentiment in favor of relaxing the formalities that surround the private pilot or student was manifest. In response to direct questions from Secretary Young, one or two advocates of relaxation lined up with Mr. Lawrence's proposal in its extreme form. They would abolish all physical requirements in those classes,—notwithstanding the fact that most of the thickly-populated states now demand some evidence of physical qualifications for every applicant for an automobile driver's license. Others, less extreme, would eliminate only the applicants unable to distinguish bright red from bright green or with other physical defects so marked as to make them really abnormal.

The test of sentiment came on two motions by Mr. Noorduyn, of Bellanca. The first, declaring in favor of a marked slackening of student permit requirements, was carried by approximately five to one,—and a substantial part of the opposition was furnished by former members of the Aeronautics Branch organization, now in the industry, all of whom were observed to vote in the negative. On a motion that the student permit should be abolished entirely, the negative triumphed by almost as large a majority as the affirmative had secured on the milder proposal. Of course these votes had no official standing, as many companies were unrepresented, while others had two or three people on hand and all voting, but they revealed the weight of personal opinion.

UPON no other topic was there prolonged argument, but Mr. Budwig's explanation of the plans for approving repair stations called forth many questions and some statements of company policy. It was made plain that the initiative in establishing an approved station should come from the airplane manufacturer, through the supply of drawings from which to work in making repairs. Contrary to the impression that had been gained by many (including the editor of AVIATION) from the first announcement, approval carries with it no exemption from inspection of the individual repair job before relicensing. It merely eliminates the necessity for new approval of the drawings from which the repair is made and for a new stress analysis. The representative of one of the largest manufacturers declared the policy of his company against any distribution of drawings. They preferred to have repair work at service stations limited to the installation of new parts or sub-assemblies received from the factory. They thought that much safer, and in the long run cheaper, than trying to rebuild in the field. Others concurred in part, but only in part.

In the period allotted to criticism of the detail of the present rules, and to the offering for comment by the industry of changes proposed by the Aeronautics Branch, most of the points touched upon were of secondary significance. Mr. Rawdon, of Travel Air, thought that the stipulations for analysis in vertical dive should be made more specific, and should take account of the actual center of pressure travel on the airfoil employed. Mr. Wright, of Curtiss, thought that the use of a properly installed bungee cord on the stick to improve longitudinal stability with free controls should be fully sanctioned, even in the largest planes. Several speakers thought that the present rules governing torque loads were too hard on the four-cylinder engine, and that there was no logical reason for singling that type out for a special and severe penalization. The chief engineer of Travel Air, again, believed the present application of loads in nosing over to be irrational. It threw the heaviest loads into the upper diagonals in the engine-supporting structure, whereas in practice it was the lower ones that always failed, if any. There was some protest against the present limitations on landing speed, and especially against the rule allowing the multi-engined planes a higher landing speed than the single-engined ones. All of which the Department of Commerce officials listened to carefully, and made no comment.

The Department's own suggestions were few and simple. The only one, in fact, that really disturbed the industry was a proposal that all seaplanes should be provided with means for mooring or anchoring with the engine running and without hazard to the crew. That brought forth indignant protest from the seaplane people. In the first place, they said, nobody with good sense wanted to make permanent attachment of a tractor seaplane to its mooring while the engine was still running, and in the second place a rigorous enforcement of the proposed regulation as now drafted would put all tractor seaplanes resembling the present types definitely out of business.

Engines BEFORE THE S.A.E.

Society of Automotive Engineers Devotes Opening Sessions at St. Louis to Power Plant Problems

By EDWARD P. WARNER
Editor of AVIATION

THE Society of Automotive Engineers put the opening session of its national aeronautical meeting at St. Louis in the hands of the engine specialists. They divided their attention between two sessions on Tuesday, receiving two papers on engine design and operation in the morning and two on fuel problems in the evening.

The first and the lengthiest contribution to the engine session was made by Roland Chilton, formerly chief engine designer of the Aeromarine Plane & Engine Company, now consulting engineer for the Wright Aeronautical Corporation. Taking as his subject "Airplane Engine Development and Operating Reliability," Mr. Chilton paved the way for his subsequent avowal of the engine designer's troubles by an outspoken challenge to the men responsible for the airplane structure to do their part in a co-operation upon a harmonious assembly of airplane and power plant.

Reliability, said the speaker, is near to the be-all and the end-all of engine design, and he dwelt upon the difficulty of attaining satisfactory standards and measures of reliability without a record of experience much more extended than is as yet available upon aircraft power plants. He observed, for instance, that if the manufacturer of engines hopes to establish a record of less than one mechanical failure for every hundred thousand hours of flight, his engine should have run at least that total length of time under his observation before he can estimate his own success. Few airplane engines, so Mr. Chilton reminded his audience, have attained even that minimum amount of operating experience, while "every popular automobile model has exceeded it many hundreds of times." The great proving ground is operation in the field, and a few dynamometer tests in the factory cannot replace it. The more rapidly operating experience accumulates, the more consistent may be the hoped-for improvement in reliability and other desirable characteristics.

What is the actual status of engine reliability as a controlling factor in the expansion of the use of aircraft? The author of the paper proceeded to analyze that question upon the basis of a "conviction that safety is the factor in which air travel is popularly regarded as doubtful, and that until the landing characteristics of airplanes are drastically changed, engine failures on transport machines are incompatible with public confidence." Recognizing the importance of a more intelligent interpretation by the popular press and by public opinion of aircraft hazards and accident reports, Mr. Chilton none the less met facts as he found them, and firmly concluded that "no compromise with safety will be tolerated."

TOWARD the presumption, occasionally encountered, that the installation of multiple engines lessens the importance of engine reliability Mr. Chilton displayed marked coolness, pointing out the lessened hazard of a forced landing during the state of normal flight in such planes, but bracketing with it a note of the extreme undesirability of sudden failure of a wing engine during a take-off or while turning sharply at low altitude.

With the importance of power plant reliability to the success of air transport and other aerial undertakings analyzed and conceded, the author went on to appraise responsibilities for giving the power plant a fighting chance to show itself reliable. He explicitly assaulted the citadel of the airplane designer, and explicitly declared that "these remarks are intended to spur the plane experts to come forward with some criticisms of existing power plants as to their shortcomings in the efficiency of the completed ship. We supply engine installation drawings, showing what the plane designer is up against when he sets out to hang our products onto his and which indicate in a general way where we stop and where he begins. . . . We would like a few sample airplane diagrams, showing, for example, the relation, size, and shape of the body which is going behind our engine, and what constitutes good streamline for the cowling between them, and how much of this should be our funeral. We would like to know if the plane constructor is going to tuck the oil tank against the bulkhead and arrange all the outlet louvres in the cowling ahead of the tank. Will he design the engine mount to be a complete structure in itself and to truly fit the engine, or must the engine when bolted into place rigidify and true up a welded assemblage of tubes?" Pursuing further his search for a line of demarcation in responsibility and for information from the ultimate consumer, Mr. Chilton asked: "Will some airplane operators come forward and express their views upon the following: What number, if any, of forced landings per thousand hours of operations would satisfy your present safety

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requirements, and how much worse than the allowable minimum do you find the best present power plant? If an increase of, say, .5 lb. per hp. would effect a three-to-one reduction in the occurrence of forced landings, do you agree that the increased safety would be worth the added weight?"

While awaiting replies to all these inquiries from the parties to whom they were addressed, Mr. Chilton showed his own sentiments by remarking (of the N.A.C.A. cowling and the Townend ring) "the definite section and location for such a cowl is another aerodynamic problem on which the engine men would like to hear from the experts, because if anything has to be hooked onto the engine, we prefer to attend to it ourselves."

From the discussion of the results of improper installation or insufficient co-operation between the engine and the airplane designer, Mr. Chilton turned to consideration of flaws in reliability occurring at the other end of the scale, latent in the raw material as it reaches the engine factory. Aggravated by severe stress conditions, by errors in design such as the leaving of sharp corners to aggravate fatigue stresses, or by errors in construction such as the leaving of scratches on a polished surface, the minutest hidden imperfection in the metal may in course of time prove disastrous.

Robert Insley

The problem of the engine manufacturer, in co-operation with the maker of the material, is the location and elimination of all such defects as hair-cracks and inclusions. It was pointed out that material improvement has been made by the introduction of new methods of inspection, such as x-ray examination and the continuous electro-induction process for examining steel bar stock. Fatigue failures are the important ones, and there are few breakages which cannot be traced to repeated stress. There then resides the dual problem of protecting against failure under normal fatigue conditions by using members heavy enough to keep working stresses adequately low and by taking every precaution against imperfect or non-homogeneous material, and of protecting against abnormal conditions by minimizing their occurrence.

OUTSTANDING among the abnormal conditions, and identified by Mr. Chilton as a leading cause of failures in flight, are the effects of resonant vibrations. The paper presented a number of examples of their alarming magnitude and of possible means of coping with them. Thus Mr. Chilton said: "A crankshaft may be constructed of material having an ascertained safe fatigue endurance stress of 40,000 pounds per square inch while it is impossible to predict any operating stress higher than 10,000 pounds per square inch, yet a failure may occur in every few hundred shafts. The failure depends entirely on how long the engine happens to be operated at a speed synchronous with the natural torsional period of the shaft system, and has absolutely no connection with calculable stresses from inertia and explosion loads." He cited the well-remembered crankshaft failures on the Graf Zeppelin as an example. [See the analysis of those mishaps contained in Commdr. J. M. Shoemaker's article on airship power plants, AVIATION for Dec. 14th, 1929.—Ed.] Pointing out the virtual hopelessness of making a crankshaft stiff enough to support the worst resonant stresses, he observed that when increase of crankshaft diameter eliminates breakage from those causes it is because the change in dimension has taken the critical frequency outside the operating range. Some form of vibration dampener becomes necessary if all critical speeds are to be eliminated.

As a further example Mr. Chilton spoke of installations in which the liability of breakage was reduced by deliberately weakening, or introducing flexibility into, some part of the transmission. Thus, a marine engine crankshaft which was inadequately strong when transmitted directly to its load proved quite satisfactory when driving a propeller through a long transmission shaft having only one-tenth of the crankshaft's own strength.

Although crankshaft failures are the most spectacular results of vibration of engine parts, they do not stand alone. Valve springs and supercharger impellers were mentioned as further examples. In the valves themselves impact loading may become serious, especially when the clearance is either greater or less than the designed figure. Clearance adjustment is important not only for silence and for efficiency, but also for reliability, for if the valve hits the teeth sooner than it was intended to, so Mr. Chilton reminded his audience, the stresses may be dangerously high.

Torsional vibrations in the crankshaft becomes especially important in connection with reduction gears, and create a special need for some dampening device or

Torsion of a Liberty crankshaft under load.

spring coupling. Without it, the stresses in the gear are almost entirely due to the vibration of the shaft, the steady torque being of minor importance. Mr. Chilton offered as proof the observation that "the 'driving' sides of the teeth do not show much greater punishment than what we humorously term the 'non-driving' sides. All of these destructive effects would be eliminated by a suitable dampener whereby the gear would only have to transmit the torque due to the power developed."

SILENCING, and especially the elimination of such mechanical noises as now come in profusion from the valve gears, reduction gears, and piston slap, was envisaged as an impending problem of imposing difficulty. In speaking of such collateral topics, as well as of reliability proper, the speaker addressed his attention particularly to engines in general resembling the present type. He did, however, comment upon the Diesel from the point of view of reliability, and expressed some doubts. Because of the severe demands made upon the fuel pumps, and the extraordinarily close fits that would have to be maintained for their proper functioning, he "ventured the prediction that an easier method of burning crude oil will be found in carbureting the fuel with the air after compression, in a device of similar theory to the present carburetor, but adapted to the greatly increased pressures, temperatures and densities which seem to him to be precisely what are needed to handle the less volatile fuel."

Mr. Chilton foresaw the prospect that such lengthy analysis of these questions in dynamics, these problems of vibration so involved that they can only be attacked by the most involved laboratory technique by invoking the aid of differential equations of a high order might be condemned as "theoretical."

Roland Chilton

He met his critics boldly, even though he pointed out in passing that all of the phenomena he had mentioned related specifically to current developments being carried on by the Wright Aeronautical Corporation. "The consistent failure of a previously satisfactory part in the first installation in which synchronous phenomena are encountered," Mr. Chilton concluded, "will puzzle anyone who regards the theory of resonant vibrations as something invented by visionaries for their own amusement. The valid criticism of a theory does not consist in pointing out that it is theoretical but in producing evidence to show where it is wrong."

"On this point a quotation from the history of the French Revolution is appropriate: 'A man called Jean Jacques Rousseau wrote a book called the Social Contract. It was a theory, and nothing but a theory. The French nobles laughed at the theory, and their skins went to bind the second edition of the book.'"

The usual informal discussion, which follows the presentation of any paper at one of the S.A.E. meetings, was a little slow in starting after Mr. Chilton finished speaking. Comdr. Bruce G. Leighton, sales manager of Wright Aeronautical Corporation and chairman of the session, tried to obtain expressions on the subject of the needs concerning engine power, fuel consumption and frontal area from the representatives of any airplane manufacturers that may have been in attendance, but no one volunteered to talk.

Phil B. Taylor of the Wright Corporation did talk on the subject introduced by Comdr. Leighton, saying that it is quite possible to increase the output of an engine if a sacrifice is made in fuel consumption. He, like Mr. Chilton, urged that the airplane manufacturers and the operators tell the engine builders just what is wanted of the power plant. To obtain both increased power and lessened fuel consumption, he admitted, was somewhat difficult, but the use of better fuels would simplify the problem.

DR. G. W. LEWIS, director of research for the National Advisory Committee for Aeronautics, closed the discussion following the presentation of Mr. Chilton's paper by reminding the engineers that the manufacturers of in-line air-cooled engines are supplying the cowling for their power plants. In his opinion, makers of radial engines should do the same. The cowling, he said, should be designed for a particular engine and the plane designed to fit the engine and cowling.

The second contributor to the engine session was Robert Insley, Vice-President of the Continental Aircraft Engine Company, who took as his subject "The Relation between Automobile and Aircraft Engine Design." Between Mr. Insley and Mr. Chilton, so far as their themes overlapped there was almost perfect harmony. But it was a little surprising to find them overlapping at all, inasmuch as Mr. Chilton had spoken almost entirely of design theory, while Mr. Insley dwelt upon markets as the controlling factor upon the designers' efforts.

In so doing he leaned heavily, as his title proclaimed, upon similarities and contrasts between the aerial and the highway vehicle, comparing both their present positions and the status of the airplane now against that of the automobile in the early years of the present century.

"Five General Characteristics"—he asserted in his opening summary, "speed, economy, safety, comfort and convenience—determine the popularity of any form of transportation. The automobile, twenty-five years ago, offered but one of these as an asset. The other four were liabilities. In speed alone the automobile surpassed its immediate rival, the horse and buggy. The cost of the automobile was nearly five times as great, its safety was openly doubted, its comfort was not even to be compared with the rubber-tired buggy, and in convenience at the time it could boast of little. Yet on the basis of speed alone it was sold to the eager public in rapidly increasing quantities. The airplane today finds itself in much the same position with respect to the automobile. Its chief asset is speed. In first cost and in maintenance, it is vastly more expensive. Its safety is openly questioned. Its comfort and convenience, to any but the dyed-in-the-wool flyer, leave much to be desired. The parallel up to this point is perfect. The automobile industry worked out its problems and one by one converted its liabilities into assets. It seems to be up to those of us who are interested in the regularity of aeronautical meals to set about vigorously to see what can be done about the cost, safety, comfort and convenience of the airplane."

Seeking for the avenue along which we can proceed to increase the popularity of the airplane and its engine

as the popularity of the automobile has increased, Mr. Insley's attention was first arrested by the difference in relative cost to the two power plants. "Many individuals" he candidly observed, "including, unfortunately, a number of airplane manufacturers, have become disturbed by the discovery that a high-grade automobile engine of 100 horsepower costs the car manufacturers something less than $300, whereas the lowest priced airplane engine of the same power cannot be purchased for much less than $1,200. The condition seems to demand either an explanation or a violent price revision on the part of the engine manufacturers."

Thus conceding the need of an explanation of engine cost, he found it primarily in low quantity and in light weight. Other things being equal, automobile engines would be relatively cheap because of the enormous production and of the possibility of designing in the confident expectation of using highly specialized automatic machinery and performing a number of jobs simultaneously. The airplane engine offers nothing like the same opening as yet. Mr. Insley laid equal stress, however, upon considerations of weight, and in so doing he challenged the common view that the quality of work in the aircraft engine is much higher than any other type. In working parts where moving contact is involved he found the closeness and accuracy of fit in good automobile engines quite up to the best aircraft standards and in some cases, where silence would be much affected by variations in clearance, considerably above the conventional aircraft engine quality.

THE ADDED COST of the aircraft engine arises in large part, he said, from the extra work done in interest of weight economy, as in machining the entire surfaces of connecting-rods, gears, cylinders, and the like. The struggle for light weight carries with it also the use of special materials, which are very costly in themselves, and of high working stresses which in turn, as previously indicated in Mr. Chilton's paper, have entailed a very elaborate system of material inspection.

Although it is increasingly accepted that weight economy in aircraft structures and aircraft engines has a very high commercial value and can well afford to be paid for at a liberal rate, Mr. Insley expressed some doubt as to the universal justification for such costly measures of weight saving. Thus he said: "The engine manufacturer often has reason to suspect that engine weight is a matter about which the aircraft operator likes to be deceived. Great stress is laid on the minimum weight of the bare engine, and that engine manufacturer who can conscientiously quote the lowest bare engine weight figures gets off with a great advantage over his competitors. Once the engine is sold the operator seems perfectly willing to hang on untold quantities of exhaust piping, generators, starters, air cleaners, oil heaters and coolers and other accessories to obtain satisfactory performance of the engine. It is natural to wonder, if the purchaser is so vitally interested in cost and apparently so little concerned about the weight of accessory gadgets, why he should object to adding a few pounds of internal weight if by so doing we may reduce the cost materially without affecting reliability. May we not swallow our pride and tear a leaf from the automobile manufacturer's book? Unmachined connecting rods are heavier than machined rods, and are commonly regarded by the aeronautical minds as untrustworthy, but try to recall when you last heard of an automobile rod failure."

Plain unmachined valve heads, cast-iron cylinder barrels, integrally forged counterweights were other suggestions. The speaker emphasized that he did not wish to offer a strong personal endorsement of these expedients, but presented them as possibilities to be considered if the operator or consumer was willing to pay a larger price in pounds and ounces for the sake of a smaller one in dollars and cents.

From cost Mr. Insley turned to safety. Under that heading, he accepted on behalf of the aircraft engine designer a responsibility having no counterpart in the automobile world. Safety on the highway depends almost entirely, Mr. Insley reminded his audience, upon chassis and body, but in the air the power plant plays a large part.

PASSING somewhat lightly over mechanical breakages and failures in fuel systems and the like, the speaker bore down upon fire hazards as having most to do with power-plant safety problems. To them he found his most likely solution in the use of low-grade fuel, whether used in the Diesel cycle or perhaps, as Mr. Chilton had also proposed, in something more like the present carburetor engine.

Comfort and convenience were vouchsafed an attention which they do not always receive. Mr. Insley found in them matter of importance for the near future: "Noise, vibration, smoke, oil have been all but forgotten in the thrill of flying, but before aircraft can be popular as common carriers they must be comfortable." Like Mr. Chilton, he saw a shadow of forthcoming difficulty in the suppression of mechanical noises and urged that the aircraft engine designer prepare to follow in the footsteps of the automobile technician in eliminating them.

Convenience, as Mr. Insley used the term, concerns itself primarily with freedom from concern over attention to the engine. He set an ambitious standard, but only one which many potential owners have already established in their own mind. It can best be described in Mr. Insley's own words: "The automobile owner, accustomed to relatively care-free transportation, will not long be content with airplane engines which are difficult to start in cold weather, which require fresh warm oil every winter day, which insist upon minute inspection and maintenance service every few hours. The automobile driver will protest violently before he will submit to ownership of an aircraft engine which cannot be buttoned up in the cowling and operated for months with only routine station servicing. Whether this be reasonable or not, the automobile driver has been trained to expect such service and the aircraft engine manufacturer must reconcile himself to the task of either providing such an engine or re-educating the user." No comment was made upon the significance of better and more generally available service at airports as a means of enabling the owner of present-day equipment to at least escape *personal* worry over its daily care by finding a commercial organization willing to accept that responsibility in full and to carry it properly.

Of the two papers that were read at the session, Mr. Insley's paper was more productive of comment than Mr. Chilton's had been. In fact, his talk led to an extended discussion dealing with ways and means of bringing aircraft engines down in price. Most of those who expressed themselves agreed that quantity production is the key to the situation. Others argued that there is less need for such rigid inspections of certain parts and materials as are customary.

"HUMAN CURIOSITY Knows No Limit," SAYS LANE

By EDWARD P. WARNER
Editor of AVIATION

"Therefore," he tells the S.A.E., "there is no limit to what airplanes must be prepared to stand."

UPON that ground, Kenneth M. Lane, Chief of the Engineering Division of the Aeronautics Branch of the Department of Commerce, defended the present spinning regulations at the aeronautical banquet of the Society of Automotive Engineers at St. Louis on Wednesday night. An audience of some four hundred heard him descant with considerable frankness upon "the defects of modern aircraft."

"The responsibilities of the Department of Commerce," said Mr. Lane, "are sharply limited." It does not attempt to supply either intelligence or originality of concept to the designer who lacks them. Its regulations are merely a starting-point toward good design, an indispensable minimum. The Department concerns itself only with those points directly affecting safety of life. The Aeronautics Branch may observe with regret, but does not attempt to remedy by dictation, the appearance of designs of assuredly bad maintenance quality, assuredly productive of air sickness in the passengers, or with other serious defects of detail arrangement and installation.

Upon the state of structural development, Mr. Lane brought very favorable report. "Structural failure," he said, "is being virtually limited from consideration in approved airplanes." The processes of analysis are being so improved, and are sufficiently well understood, as to make certain that a plane will hold together under any flight conditions that can reasonably be expected,—which is a fundamental necessity. "No matter what other virtues a plane may possess, it is difficult to appreciate them properly if the wings start falling off."

One structural feature upon which the Engineering Division has still to issue frequent warnings in the support of the false spars that carry the ailerons. They sometimes hang on the ribs without adequate means of carrying the shear loads from the aileron hinges forward to the rear main spar of the wing. A frequent point of weakness in the past was the hinging of the control surfaces themselves, but that has been substantially overcome as an inherent weakness in new aircraft. Bearing surfaces are still in some cases so limited as to make for very rapid wear and cumbersome and expensive maintenance.

The Department still occasionally finds designers making the error of assuming that structures will distribute loads in conformity with the rule-book or with hope, rather than with common sense. Thus a structure has recently been encountered in which two landing-gear members were rigidly welded together and it was assumed that one of the two carried a very large amount of bending, without transmitting any to the other. The explanation was that the tube to take the bending was marked "axle" on the blue print and the other called "strut," but Mr. Lane expressed fear, as later in another connection, that the airplane could not read and therefore would not know what was expected of it.

WHILE CONCEDING a generally satisfactory present state of the stress analysis art, Mr. Lane spoke in warm advocacy of more refined and advanced methods of analysis, such as the theory of least work. Actual calculation of stress distribution in indeterminate structures would always save weight in comparison with design by assumption and, in his opinion, refinements permitting the pursuit of secondary stresses to their ultimate pound per square inch should be still more used. It is a little ironical that when the method of least work was first introduced to the American aeronautical world, some ten years ago, in a report of the National Advisory Committee for Aeronautics, it was treated with contumely, yet in those days the multi-bay biplane structures commonly used were genuinely redundant and the consequences of introducing the theory were of first-rate importance. Now that structures are much simplified and there is on the whole less reason for using it, it has become a very respected tool.

If designers prefer to use static tests to demonstrate the strength of their planes, especially in cases where the

structures are exceedingly complex and difficult to analyze, the Aeronautics Branch has no objection, but it insists in that event that the test of the completed structure be coupled with tests of the material entering into it. It refuses to approve of a design upon the basis of static test without assuring itself that the materials used in the tested airplane at least approximate in quality to the minimum permissible under the specifications which will apply to the regular production.

The general condition of structural affairs Mr. Lane foound very satisfactory. With aerodynamic development he was not so well pleased, and he urged more strenuous work along that line on the nation's designers. His complaint did not, of course, apply especially or solely to American aircraft as seen by the Department of Commerce but to the whole state of the art.

THE RIGOROUS ENFORCEMENT of the much-discussed existing spinning regulations has largely cleared up the problem of the intentional spin in approved types, and removed the hazards of spins deliberately entered into at considerable altitudes. Mr. Lane firmly believed, expressing himself in the phrase chosen as a title for this report, in the necessity of reckoning with the intentional spin in all planes. With respect to unintentional spins, fallen into unexpectedly from a turn at a low altitude, conditions are not so good. The speaker was very anxious to see better provision against that mishap than some otherwise satisfactory planes now provide, and better control and stability generally in stalled attitudes, and he encouraged his audience to believe that substantial improvements should be in prospect.

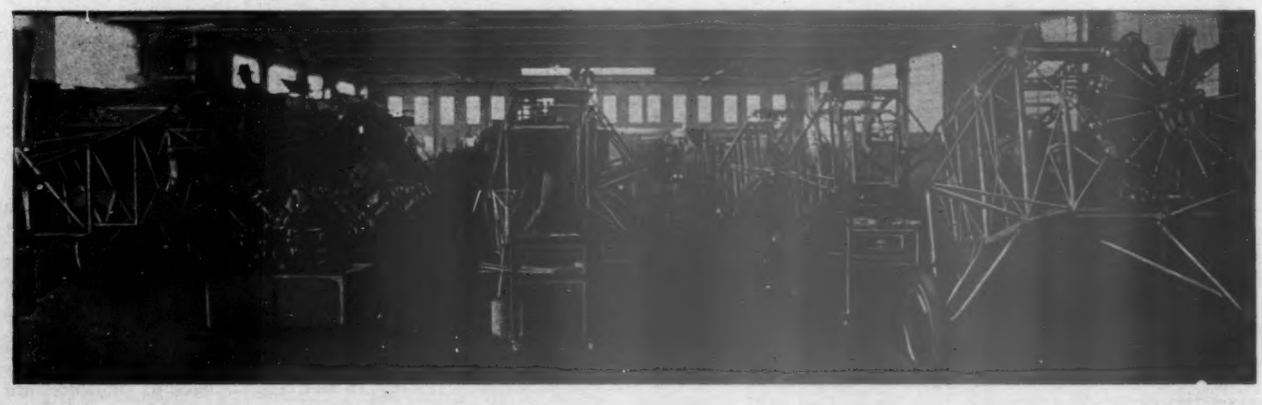
A minor defect in lateral control, encountered in a number of cases, is the provision of inadequate mechanical advantage on the ailerons. The distance that the stick can move being positively limited by the width of the fuselage, to secure the necessary angular throw of the ailerons it has often been necessary to use gear ratios requiring uncomfortable if not impossible exertions from the pilot. The obvious remedy in such instances is the use of a wheel control.

Other points of weakness, however, Mr. Lane found quite as serious as any that could be studied in the laboratory or assigned to any definite branch of aeronautical theory. Some designers appeared to consider that their task was done when they had laid out the structure and turned the arrangement of the cabin over to an interior decorator, with authority to let his imagination run riot. There were planes which did not go far enough beyond the minimum laid down by the department's rules in providing against fire hazard. There were planes which were needlessly and offensively noisy, especially with high-pitched notes which Mr. Lane considered directly responsible for much airsickness. There were planes in which comfort had been secured at the expense of unreasonable additions of weight, and others in which comfort had not been secured at all. Such matters deserved careful and continuous thought.

ONE OF the defects of modern aircraft is the frequent failure of performance as seen by the stop-watch and barograph to synchronize with performance as seen through the roseate spectacles of a sales engineer or advertising manager. Again the speaker indicated his regret that the airplanes were not sufficiently literate to peruse the advertisements and learn what was expected of them. Failing that, he hoped for the development of independent agencies to do performance testing and certify the results. He considered the provision of some means of guaranteeing the reliability of performance as of prime importance, but he made no mention of the possibility of the Aeronautics Branch taking on the work itself as an incident of approved type testing (as frequently urged editorially in AVIATION).

As a prelude to the principal paper, the Wright Medal, awarded annually for the best paper on airplane design or construction, including aerodynamical and structural theory, presented before the Society of Automotive Engineers during the year, was conferred on Ralph H. Upson. Mr. Upson received the award, made in an address of presentation by Dr. George W. Lewis of the National Advisory Committee for Aeronautics as the senior member of the committee of judges, for his paper on "Wings,—A Coordinated System of Basic Design," given at the national aeronautic meeting of the S.A.E. at Cleveland at the time of the air races. (And abstracted and discussed at considerable length in AVIATION for Sept. 7th). The winning paper had included a detailed analysis of the variation of structural weight and total drag with such wing characteristics as section thickness, aspect ratio, taper in plan form, and amount of external structural bracing.

In introducing the speakers Charles L. Lawrence, the toastmaster, made brief observation upon the glider movement from a somewhat divided state of mind. Publicly confirming the great interest in glider development which his active support of the National Glider Association had already displayed, he was none the less much alarmed over the possibility of an epidemic of accidents. He earnestly hoped that the Department of Commerce would take the matter in hand and enforce safeguards at least upon the structure of the machines in operation.



Mechanical Aids

TO THE DIRECTIONAL SENSE

Radio and Instruments Receive Attention from the Engineers at St. Louis

By EDWARD P. WARNER
Editor of AVIATION

ON Wednesday morning, with Charles H. Colvin, President of the Pioneer Instrument Co., presiding, the members and guests of the Society of Automotive Engineers addressed themselves to problems of navigation by instruments contained entirely within the airplane. On Thursday morning, with Colonel Halsey Dunwoody of the Universal Aviation Corporation in the chair, the very closely connected subject of aircraft radio was discussed. Of the total of twelve papers given at the aeronautical meeting, five were concerned with aids to navigation and with communication.

The instrument session was featured by the first public appearance of (ex-) Lieut. James H. Doolittle as a civilian. Taking his subject from his recent work under the sponsorship of the Daniel Guggenheim Fund rather than from his new connection with the petroleum industry, Lieut. Doolittle talked of fog flying and its practicability from an eminently practical point of view.

He came to grips with his subject forthwith, and before abstracting his detailed discussion of the problems that had been encountered in the Guggenheim Fund's work and the way in which substantial part of them at least had been overcome under test conditions. It is appropriate to reproduce jointly his introduction and his conclusion, which together offered both a summary of accomplishment and an inspiration to further endeavor.

"The time has come when no airplane is thoroughly equipped that cannot be flown by instruments alone. That is, it must be possible for the pilot not only to retain complete control of the airplane, but to direct it to any desired point regardless of weather conditions. Furthermore, no pilot has completed his training until he has learned to fly an airplane by instruments alone without the need of any reference point outside the airplane."

"With the instruments now developed and readily available, it is possible to fly indefinitely without being able to see outside the cockpit. It is possible to leave any given point and arrive at any desired destination. It has been proven possible to land at the desired point after arriving, provided the terminal field is prepared for instrument landing."

"Although the results of these tests covered a period of several months, during which hundreds of blind landings were made, without any breakage, and showed conclusively that it is possible to land by instruments alone, the procedure is still in a highly experimental stage and it now remains for some interested agency to continue the tests and develop this or some improved process to a point where it is commercially applicable."

"When this is brought about, the airplane will become the safest known means of transport, as it will be the only one that can operate unhampered by fog."

The detail of the instrumental equipment used in the Guggenheim Fund demonstration as recited by Lieut. Doolittle will be only briefly summarized, as it has recently been given in the report issued by the Fund and in the paper presented by Professor W. G. Brown at the National Safety Council meeting last October. The special instruments used were an artificial horizon (gyroscopic) directional gyro, and a Kollsman altimeter which could be read to ten-foot intervals.

COMMENTING on the use of the instruments, the speaker explained that the altimeter had to be readjusted at brief intervals to allow for changes of dynamic pressure at sea level, information on that part being received from the ground by radio, and that the directional gyroscope could be relied upon to indicate true direction only over a relatively brief period. In a long flight it would require occasional check against the magnetic compass, to determine the amount of its wandering from its original orientation. In spite of the impossibility of using it as the sole dependence throughout a flight Lieut. Doolittle spoke very highly of the gyro as a steering instrument, since accelerations of the airplane due to rough air or change of course leave it quite unaffected and it gives steady readings while the magnetic compass will be swinging about.

The installation of a standard aircraft radio receiver with vibrating reed frequency meter in Lieut. Doolittle's plane had made it possible to receive vocal communication and either auditory or visual indications from the radio beacon. In the experiments at Mitchel Field the auditory type of beacon was used for general long-range indications, and visual indication was supplied by the

short-range beacon designed to bring the pilot exactly to the center of the field.

As previously indicated the description of the instrumental equipment, as just summarized, contained no novelty. Lieut. Doolittle's paper, however, offered the first account in his own words of his actual piloting technique during the blind flying demonstration.

The description can best be given by direct quotation at length. "The localizer beam was followed for about four miles. During this time the plane was gradually climbed to about a thousand feet. A 180-degree turn was made at this point and the beam followed to the beacon. As the beacon was approached the beam became narrower and while it was more difficult to follow, the course became much more exact. The visual type indicator consisting of two vibrating reeds indicated to the pilot his position with respect to the beam center. When to the right of the beam the right reed vibrated through a greater amplitude. When to the left of the beam the white smear caused by the vibration of the left reed became longer than that of the right. When exactly over the center of the beam path the reeds vibrated with equal amplitude. Upon approaching the beacon house, the intensity of the signal increased rapidly and it was necessary to cut down the volume control. At the exact moment of passing over the beacon house, the reeds stopped vibrating momentarily and then started to vibrate again in the opposite sense. The beam was followed about four miles from the field again, but this time in the opposite direction. Another 180-degree turn was made and the field again approached along the beam path. Altitude was gradually lost until at 400 feet, ample to clear all ground obstructions in the vicinity of the field, the plane was again leveled out and a course toward the beacon house followed. This time extreme care was exercised to follow the exact center of the beam and avoid the natural tendency to fly a zigzag course rather than a straight line. The course was held by means of the directional gyroscope and the necessary slight changes in course made from time to time. In this case, knowing the exact direction of the beam facilitated the work as it was immediately known when a wrong direction was being flown, even though the reed indicator still showed that the pilot was on his course. When the directional gyroscope and the vibrating reed indicator both showed that the pilot was on his course and proceeding in the right direction, it was then merely necessary to hold this course with very slight variation in order to arrive at exactly the desired point. In previous tests where the directional gyroscope was not employed, it had been found extremely difficult to follow the beam into the field as the tendency, when the beam narrowed down, was to fly out of the beam continually on one side or the other and difficulty was always experienced in getting back on the beam without completely recrossing it. Upon passing over the beacon house again, the reed stopped vibrating and at this point the motor was throttled, an air speed of 60 miles an hour assumed, and the plane held with the wings absolutely level. Previous experience had shown that if the rate-of-climb indicator did not indicate a rate of descent in excess of 600 feet a minute, the plane could be flown directly into the ground and the landing gear would absorb the shock of landing without difficulty. When the rate of descent was above 600 feet a minute or the landing speed above 60 m.p.h. the shock of impact was uncomfortable and the plane bounced considerably. With a properly designed long travel oleo, it would be possible to fly an airplane into the ground at rates of descent considerably in excess of 600 feet per minute. [The Curtiss Tanager is an example.—Ed.] At 50 feet altitude the throttle was opened slightly, to a previously determined mark on the throttle segment, and the r.p.m. came up to about 1050. The air speed was still held at 60 miles an hour, and the slight amount of throttle flattened the glide out until upon landing the rate-of-climb indicator was showing about 400 feet a minute instead of about 1000, which was the rate of descent during the glide with power off."

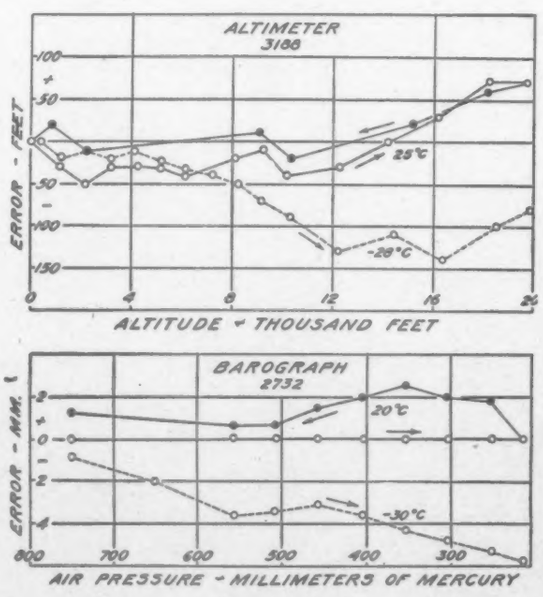
E. W. Rounds

Following his address, Lieut. Doolittle qualified the statement that "hundreds of blind landings were made without any breakage" by explaining that the landing gear was slightly damaged on two occasions. He added, however, that this was negligible, for in both instances the damage was so slight as to be discovered only after the plane had been taxied in.

Departing from his printed paper Lieut. Doolittle spent some minutes in stressing the importance of instrument board layout.

"The old method of pouring instruments onto a board from a waste basket has passed," he said. "With so many devices needed, instruments must now be carefully laid out in such a way that the pointers form a straight line when the craft is in normal flying attitude. Any digression is then quickly noticeable."

IT WAS ASSERTED that blind landings could best be effected by flying directly into the ground with good shock absorbers, rather than by attempting to sense the ground level with the instruments,—a method which several times resulted in "landings" five and ten feet above the earth. Attempts were made to inform the flier of his landing position by radio telephone, but this was soon



Typical calibration charts, and the effect of temperature

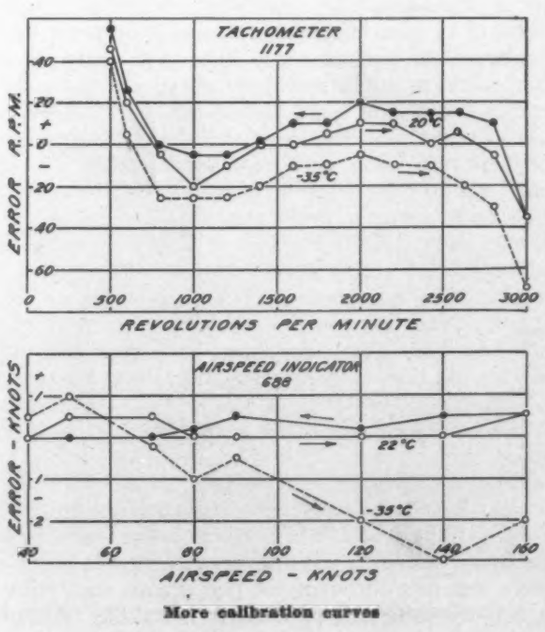
discontinued because the various visual, vocal, and radio reactions involved through the observer were too slow in comparison with the speed of the plane. Obviously, too, the observer could not see the plane in a fog of any density.

When asked, during the discussion, concerning the experience required for such blind flying, Doolittle emphatically replied that the average competent pilot was sufficiently capable. "I have successfully taught both a Major and a Second Lieutenant to land blind," said he, explaining that the Major represented the more advanced and experienced flier, whereas the Second Lieutenant stood for the younger flying element. "Of course," Doolittle added, "a flier with but a few hours is not eligible, still needing all his faculties for flying the plane."

The subject matter of Lieut. Doolittle's paper lay on the border line between navigation and radio, being concerned with both. Devoted entirely to the instruments installed in the plane was the contribution of Mr. J. B. Peterson, of the Bureau of Standards, and Lieut. E. W. Rounds, of the Navy Department's flight test section, lately test pilot in the Guggenheim safety competition.

The author's primary purpose was to emphasize the necessity for special equipment carefully maintained, and for the use of very special knowledge in making and interpreting tests if the results were to have any validity. Manifold were the pitfalls revealed for the unwary engineer who may suppose that a general knowledge of physical science is adequate for the supervision of performance testing. Errors in altitude due to differences between true static air pressure and the pressure at the point where the barograph is installed in the moving airplane, and having to be eliminated by connecting the instrument to a static tube outside the fuselage, errors in barograph clock rate due to temperature changes, errors in temperature readings due to the direct impact of solar radiation, and numerous other sources of trouble equally easy to overlook received attention from Messrs. Peterson and Brown. They particularly stressed the need of a shock-absorbing suspension for the barograph and the importance of frequent recalibration of tachometers.

The authors had no unfavorable observation to make upon the accuracy and reliability of the best existing types of testing barographs. For general temperature measurement on all types of airplanes, they recommended the electric-resistance type of thermometer. For measuring r.p.m. the chromometric tachometer was once considered the only acceptable type, and is still recommended, but a special note was made of the steady improvement in the centrifugal type and of its longer life. The unsatisfactory qualities of flow-meters were deplored, and the papers described, as the only acceptable basis for fuel consumption measurement on an airplane with a single main tank, the somewhat circuitous process of starting with full tanks, climbing immediately to a stated altitude and immediately descending, then filling up again and repeating the flight but with an hour of cruising at constant air speed and altitude interpolated between the climb and descent. The difference between the amounts of fuel required to refill the tank after the two flights obviously represents the hourly consumption under the test conditions.



More calibration curves

THE LEAST TECHNICAL of the three papers presented at the radio meeting was that of Herbert Hoover, Jr., of Western Air Express. Mr. Hoover wrote from the point of view of the practical operator upon the difficulties encountered in introducing radio as a reliable commercial instrument and upon the considerations affecting the choice of a wave length. Commercial aeronautical radio in this country began with the broadcasting of weather information and the operation of radio beacons by the Airways Division of the Department of Commerce. That service has been confined, as practically all aeronautical radio communication in European countries is still confined, to the band of frequencies between 250 and 375 kilocycles internationally assigned to aeronautical purposes.

Herbert Hoover, Jr.

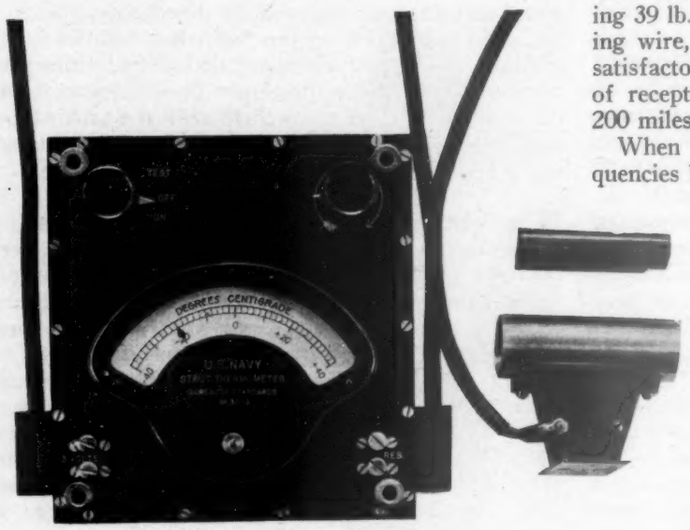
American operators have considered it impracticable to carry on two-way communication with their planes on that same frequency band. The decision was therefore reached, as is of course well known and as Mr. Hoover recapitulated by way of introducing his discussion of present problems, to reserve the band of frequencies mentioned exclusively for broadcasting and to use short wave lengths for communication. The available high frequencies ranged between 1,500 to 6,700 kilocycles, corresponding to wave lengths between 45 and 200 meters.

By day wave lengths of from 45 to 80 meters are found satisfactory, but at night a longer wave is needed to avoid "skipping" or irregular reception at intermediate distances. If a single channel has to be used throughout the twenty-four hours, Mr. Hoover explained that the wave length should be between 80 and 200 meters. It is preferable, however, to change frequency at dawn and at dusk, using at all times the frequency best suited to the conditions of the moment. Wave lengths of much more than 80 meters are in many cases objectionable, especially by day, because they are so far in excess of the fundamental wave length of the fixed antenna mounted on the airplane.

A fixed antenna is used to eliminate directional effect

and also permits of communications when flying low down, eliminating the necessity of reeling a wire in and out.

The Radio Commission has worked with the air transport operators in developing a scheme of high frequency allocation in four groups. All the transport lines assigned to a single group, which will be so selected as not to be close enough geographically to interfere with each other, will operate on the same frequency. The frequency of 3,106 kilocycles (97 meters) is to be reserved for emergency or itinerant use by planes not



An electric-resistance thermometer.

operating on fixed lines, and all ground stations will guard that frequency at all times.

The choice between phone and code operation, Mr. Hoover said "was up to the individual transport companies." At the present time opinion is about equally divided, perhaps somewhat favoring the telephone because of the elimination of a specially trained radio operator. Code operation is preferable in flying over water, as surface vessels may then more easily be worked.

The speaker passed lightly over the technical details of equipment, as they were to be the subject of other papers at the same meeting. He found none of the available methods of supplying power to the generator entirely satisfactory. Even more unsatisfactory was the present-day ignition shielding as supplied with the equipment purchased by the air transport operators. "Up until the present time," Mr. Hoover said, "shielding has been an afterthought. No adequate motor shielding is available to the industry outside that fabricated by a few of the larger transport companies for their own use. In the face of this fact the industry as a whole is soon to be required by law to have reliable radio communication between planes and the ground."

In the course of the discussion on Mr. Hoover's paper, R. E. Gross, engineer of the Radio Commission, gave his views on aeronautical radio in Europe, whence he had just returned. He spoke in the highest terms of the efficiency of operation on European air lines, and especially of the excellent meteorological service maintained by international co-operation. He also had great praise for the British work on direction finding. The equipment, however, he considered not quite up to American standards, especially in the high frequency region, almost all European work being in the intermediate frequency band internationally assigned. Dr. Kruger at Adlerhof has been working with high frequencies for aeronautical service for some years, but the equipment has not as yet gone into regular commercial operation.

The other two papers were more technical in their nature and addressed more to radio specialists than to aircraft operators. E. L. Nelson and S. M. Ryan of the Radio Development Division of the Bell Telephone Laboratories discussed equipment for aircraft communication as developed in their organization. For handling the low frequency weather report, they had a set weighing 39 lb., including the antenna. To eliminate the trailing wire, a streamline mast 7 ft. high had been found satisfactory as an antenna mounting. The normal range of reception from the airways stations is from 125 to 200 miles.

When the two-way communication and high frequencies became a factor, new sets had to be developed. The particular one which they described would transmit on frequencies from 1,500 to 6,000 kilocycles. The total weight, including antenna, is approximately 160 lb. The largest single unit of the set, the transmitter, weighs 33 lb., and is approximately 16x14x10 in. in outside dimensions. Like Mr. Hoover, the authors from the Bell Laboratories discussed the problem of power supply, and found none of the existing alternatives entirely sufficient. They suggested the possible desirabilities of aircraft electrical systems and of the raising of the basic voltage on large aircraft from 12 to 32. Like Mr. Hoover, too, they urged attention to the possible desirability of a small auxiliary gasoline engine to drive the radio generator.

Both Mr. Hoover and Mr. Nelson had given more than incidental attention to shielding of the ignition and other electrical units, urging that as probably the most serious problem in radio utilization. The third paper on the program by E. A. Robertson and Dr. L. M. Hull of the Radio Frequency Laboratories was devoted entirely to that topic.

Seeking to give his audience some conception of the difficulty of the problem, Mr. Robertson explained that partial shielding might seem very effective at certain frequencies, but proves quite useless at others. To secure really effective shielding over the range of frequencies which aircraft radio now demands, nothing has been found to supply the place of complete metallic casing of the electrical systems of the engine and airplane. Ignition interference is most serious at high frequencies, and shielding has therefore been a less serious problem for European than for American operators. The device of inserting a resistance in the spark circuit, for example, which has been much acclaimed in certain European countries, has been uniformly unsatisfactory against present American demands.

Mr. Robertson pointed out that there has been much discussion of the elimination of the necessity of shielding, as of the elimination of static from radio reception by making the interferences cancel themselves out, using two receiving circuits, which being in the interferences with equal strength, but the desired signals vary unequally, and then throwing the two against each other so that only the difference of strength is audible. Although

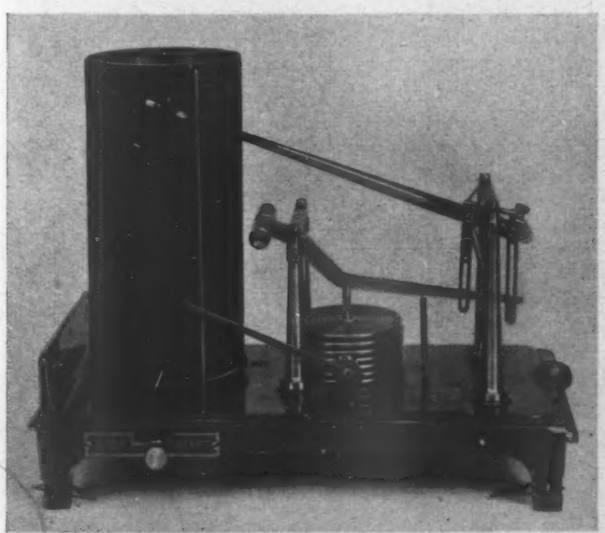
this device has not yet been given practical application, Mr. Robertson saw in it the germ of a possible hope.

Failing anything to replace straight metallic shielding, work along that line has been carried on by various commercial organizations, following upon the original researches and the inspiration of Wright Field and of the Bureau of Standards with great success. The shielding now available reduces the interference as indicated by charts shown with the paper by some 99.9 per cent, and the added weight of the equipment to secure that notable suppression of disturbances is a little less than 10 per cent of the total engine weight.

The shielding of wiring and magnetos is comparatively simple, if no consideration is given to maintenance. When thought is taken of the necessity of periodic inspection and occasional replacement and also of the effects of oil working in through a metallic braid covering and lying adjacent to or impregnating insulation on the cable, the problem appears less simple. It still remains almost an elementary one, however, compared with the shielding of the spark plugs.

The special difficulty in the case of the plug is the reconciling of proper shielding with proper cooling and absence of fouling. No completely satisfactory plugs, incorporating their own shielding in design, are, according to the speakers' view, as yet commercially available. Mr. Robertson showed slides and spoke in very favorable terms of the superposed plug shields developed by the Aircraft Radio Corporation and pierced with cooling louvres, which not only give complete shielding but also make the plugs run cooler than they would with casings and actually reduce the liability of fouling. One point the speaker stressed in connection with spark plug shielding, possibly minor but nevertheless seriously annoying, was the absence of standardized terminals. He knew of no two shielded plugs at present using a common type of terminal, and urged that the manufacturers should use the agency of the Society of Automotive Engineers to come to a mutually satisfactory agreement.

The interest of the subject was apparent in the discussion, for, in spite of the somewhat technical nature of the paper and the fact that it had not been preprinted in advance, there were many in the audience who were anxious to ask questions or to contribute their own experiences. Aircraft operators were particularly well represented. Mr. Hoover congratulated Mr. Robertson on the progress he saw in his paper, but considered that even the best systems of shielding displayed by him were not yet up to the demands of the transport companies, taking into account ease of disassembly effect on engine reliability and all other considerations. He expected, however, that there would be much further progress in the next six months.



A double-traverse barograph for performance test work

MR. EELLS of National Air Transport observed that most radio applications would be on the intermediate frequencies only, and that some relatively simple and light form of shielding should be available for and used by the airplanes which would not seek to maintain two-way communication. In reply, Mr. Ryan of the Bell Laboratories doubted the feasibility of making any substantial saving in either weight or money by using a second-rate shielding. He believed that all shielding employed should be effective for all wave lengths.

Another operator protested that the engine manufacturers were treating the matter too lightly, and were considering that the air transport lines could be used as their laboratory on which to play about with experimental schemes of shielding, notwithstanding their great responsibility for the lives of their passengers. A representative of Universal Air Lines took a more optimistic view, declaring that the harness which they developed, and which had previously been commented upon favorably by Mr. Robertson, would serve to shield the ignition exclusive of spark plugs for the normal period between engine overhauls, without requiring attention to itself.

C. Francis Jenkins, the well known inventor and television expert of Washington, ran the discussion onto a fresh track by denying the necessity for any shielding at all. Using his new device [recently described in AVIATION] of a horizontal antenna held streaming out behind the plane by a miniature wind sock, he had been able to maintain two-way telephone communication over a 200-mile distance with a set weighing 26 lb., total for receiver and transmitter, and no shielding whatever. This was possibly by keeping the antenna in the electrical shadow of the metal fire wall.

Although apparently the experiment had not been tried elsewhere just in the form that Mr. Jenkins had proposed, and he urged that the transport operators see for themselves what a horizontal antenna would do, his remarks evoked some skeptical reactions. Dr. Parks of the Radio Frequency Laboratories doubted if Mr. Jenkins could obtain such good results with a receiver of very high sensitivity. Admitting that he had not tried to use one, Mr. Jenkins asked why he should. His object had not been to handicap himself by limiting himself to a given sensitivity or type of receiver, but to maintain communication over an adequate distance with light weight equipment, and that he had done. Mr. Hoover observed that the high-sensitivity receivers now used had originally been introduced because the Bureau of Standards had found that the rigid vertical antenna was required for symmetrical reception of radio beacon impulses and the maximum vertical dimensions available with a fixed mast support on an airplane could be only about five feet. Mr. Eells closed the discussion with some unfavorable remarks about masts in general, with special reference to their penchant for accumulating ice and vibrating. The mast had been replaced on several of the National Air Transport planes with an inclined wire from just behind the cockpit to just above the top of the rudder, with results which appeared to be entirely satisfactory.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

Many at Aviation Education Meetings

Material for '30 Activity Is Gathered by Committees

ST. LOUIS (MO.)—The National Conference on Aeronautical Education, held at Hotel Statler here in conjunction with the International Aircraft Show, attracted about one hundred delegates from all sections of the country. The meeting was conducted by Roland H. Spaulding, chairman of the Educational Committee of the Aeronautical Chamber of Commerce, and one object was to gather material which may be used by that committee in its activities during 1930.

Three Classifications

Each delegate served on one of three committees appointed to consider specific problems in the fields of collegiate aeronautical education, ground school training, and elementary and secondary aeronautical education. Two and one-half days were devoted to addresses and discussions in these three fields, after which the respective groups presented a report of opinions and recommendations at a final general session terminating the conference.

At a luncheon opening the meeting, Dr. George R. Throop, Chancellor of Washington University, St. Louis, stated that education must not only concern itself with time-honored, traditional subjects but with the needs of the community, of which aviation is one. The specialties and novelties of today, he explained, become the traditions of tomorrow.

Following this address, a general meeting was held at which four speakers laid the groundwork for the conference.

Says Future Lies With Youth

The future of aviation, according to Dr. John W. Withers, chairman of the Guggenheim Fund Committee of Elementary and Secondary Aeronautical Education and Dean of the School of Education of New York University, depends upon the education of the boys and girls of this generation and the proper preparation of teachers for competent instruction in the subject. He expressed the opinion that the emotional minds of most adults are inevitably against aviation and in favor of the commoner transportation media; but that school children, if properly instructed and made familiar with the present and increasing safety of air transportation, will grow up to look upon aviation as a natural phenomenon.

The aeronautical eduction of children, Dr. Withers said, must be done out of school as well as inside of it. The science may be brought within the realm of actual experience by clubs, group projects, conversations, moving pictures, radio lectures, designing and building models, etc., but this experience, to be used, must be coupled with formal instruction in the vocabulary of aeronautics, mechanical drawing, art, history, economics and the like, he asserted.

Andrew D. Althouse, head of the aeronautical department of Cass Technical High School, Detroit, said the chief problem of ground schools lies in a shortage of capable instructors. He said some universities are training teachers for this field, but it is difficult to obtain the best men for public schools because the demand is so great within the industry itself. He recommended an enlarged program of teacher training.

An outline of the progress of aeronautical instruction in the high schools of California and in the University of Southern California was presented by Dr. Earl W. Hill, of the latter institution, who is chairman of the California State Advisory Committee on Aeronautical Education and Educational Director of the Western Air Express.

Tells of Government Services

The original air program, started in the University's night school for adults, has been incorporated in a course now being offered in the high schools of the state; while the University's enthusiasm has grown to the extent that it offers a four-year course leading to a degree in the College of Business Administration.

J. S. Marriott, Chief of the Inspection Service, Aeronautics Branch, listed the many services offered by the government for assisting in the development of adequate ground schools and flying courses and aeronautical education in the schools.

Chairmen of the committees appointed were: Aeronautical Education in Public Schools, B. G. Shackelford, Assistant Superintendent of Public Schools, St. Louis; Education in Colleges and Universities, Bradley Jones, head of the aeronautics department, University of Cincinnati; and Aviation Ground School Education, W. Harold Taylor, head of the ground school, University of Buffalo.

Models and Gliders Aid

Addressing the first named committee, Charles S. "Casey" Jones, president of the Curtiss-Wright Flying Service, said the school child of today is familiar with the history of aviation as told by the famous flights and exploits, and that the question is to determine how much further the subject must enter the schools. He suggested "more and better model airplanes" and later the construction of full-size gliders. An elementary course in aeronautics, of a vocational nature, should include engines, aerodynamics, navigation and simple meteorology including cloud formation study and barometric pressure, Mr. Jones said.

The group on ground school education was addressed by Willis B. Haviland, director of schools, Universal Aviation Corp., who pointed out that the ground personnel represents 90 per cent of the people engaged in commercial aviation and that the importance of properly training these men is consequently enormous. Mr. Haviland said that a properly drawn curriculum should thoroughly cover the theoretical side of the basic subjects that pertain to aviation but should be combined with practice so as to yield the highest degree of efficiency.

Warner Discusses College Work

Edward P. Warner, editor of AVIATION, addressed the group on aeronautical education in the higher institutions of learning. Mr. Warner was formerly professor of aeronautics at Massachusetts Institute of Technology and was also Assistant Secretary of the Navy for Aeronautics.

The ground school committee, in its deliberations, brought up the subject of the Government's requirements for airplane and engine mechanics. Most of the members seemed to feel that the requirements are too low, that many incompetent men are getting licenses, and that the Department of Commerce should formulate higher standards. The committee also considered the qualifications of instructors, the equipment required for shops and laboratories, and methods of instruction.

Show Attendance And Sales Reported

ST. LOUIS (MO.)—Claims made here by the various manufacturers set the show sales of planes, engines, and accessories in the neighborhood of two and one-half million dollars. The majority of plane orders fell in the distributor and dealer classification.

Attendance at the International show, which had an eight-day run, reached a total of 136,000 persons through Saturday night. Estimating Sunday's visitors at more than 20,000, this puts the total attendance at approximately 160,000.

Lee Schoenhair Breaks Six Weight-Speed Marks

JACKSONVILLE (FLA.) — Six records were recently shattered by Lee Schoenhair, chief pilot for the Goodrich Rubber Co., Akron, Ohio, in that firm's Miss Silvertown, a Lockheed Vega. The extra weight carried, his time, and holder of the old record:

1. Carrying an added weight of 500 kg. over a 100 km. course, average speed, 185.452 m.p.h. Former record held by Fernand Lasne, France, with 174.662 m.p.h.

2. Carrying an added weight of 500 kg. over a 500 km. course, average speed, 171.228 m.p.h. Old mark of 158.656 m.p.h. held by Capt. H. S. Broad, England.

3. Carrying 1,000 kg. added weight over a 100 km. route, average speed,

Lee Schoenhair

175.977 m.p.h. Captain Broad had established a record of 160.280 m.p.h.

4. Carrying an added weight of 1,000 kg. over a 500 km. course, average speed, 168.114 m.p.h. Captain Broad's mark was 158.656 m.p.h.

5. With an added weight of 500 kg. over a 1,000 km. course, average speed, 152.702 m.p.h. Lasne formerly held the record with 146.660 m.p.h.

6. Carrying an added weight of 1,000 kg. over a 1,000 km. course, average speed, 152.702 m.p.h. The mark of Paillard and Champlan of France, was 137.198 m.p.h.

D.A.C. Expands on West Coast

LOS ANGELES (CALIF.) — Ted Schleuter, western sales manager of the Detroit Aircraft Corp., has announced the opening of new offices in Oakland and Seattle. P. L. McMullen will be in charge of the Oakland office at 1301 Tribune Tower Bldg., and W. A. Williams will direct the office in Seattle, which will be at the Hoge Auto Supply Co. All divisions of the Detroit Aircraft Corp. will be represented by the new offices.

Aero Branch Wants $259,000 for Deficit

WASHINGTON (D. C.) — The deficiency appropriation bill which was recently reported to the House contains an amount of $259,000 for the Aeronautics Branch of the Department of Commerce. Most of this money will be used for field inspection service and engine-testing work, although some of it will cover salary increases to employees in the District of Columbia. Provision of additional sums is also made for the purpose of carrying out the work of inspecting flying schools and in connection with research work and weather reporting facilities.

In testifying before the Appropriations Committee, Maj. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, said that $64,000 is necessary for salaries of additional field inspectors and $74,000 is necessary for their traveling expenses. A sum of $24,000 is requested by the section of the department in charge of engine-testing work.

For the purpose of providing additional air navigation facilities, $74,700 is necessary, the committee was told by Capt. F. C. Hingsburg, chief of the airways division. Part of this money will be used by the Bureau of Standards in carrying out certain research activities and the rest will be used by the Weather Bureau, he said.

Norgren to General Instrument

LOS ANGELES (CALIF.)—The Carl A. Norgren Co., Inc., of Denver, Colo., has been purchased outright by the General Instrument Corp., and the entire plant will be moved to Los Angeles at once, according to the announcement of Herbert E. Linden, Pacific Coast manager for the Bendix interests, of which General Instrument Corp. is a subsidiary. Manufacture of the line of air hose couplings, pneumatic fittings, tire filling chucks, automatic tool lubricators, industrial blow valves, air pressure valves, and alemite spray guns formerly turned out in the Denver plant, will be conducted in the new Bendix building, recently completed here. The executive offices of the new building will be ready for occupancy by April first, while the new airway beacon will be completed this month.

HIGH POINTS in the NEWS

▶ *Attendance and sales.* Eight-day run of International Aircraft Show at St. Louis reported to have attracted some 160,000 visitors. Orders taken at exposition for planes, engines, and accessories reported (the reader may be skeptical if he wishes) to have reached the neighborhood of $2,500,000 in value.

▶ *How to teach them.* Nearly a hundred delegates discussed this problem at the National Conference on Aeronautical Education held in St. Louis during the International Aircraft Show and sponsored by the Aeronautical Chamber of Commerce.

▶ *Twenty to start with.* That number of aero projects are planned for 1930 by the National Aeronautic Association Board of Governors.

▶ *Six to Schoenhair.* In a Lockheed Vega, Lee Schoenhair breaks six world marks for speed flights with loads; formerly held by England and France.

▶ *Financing agreement.* General Motors Acceptance Corp. agrees to finance the sale of Fokker craft on a time-payment basis.

▶ *More black than red.* Balance sheet of Air Investors, Inc., for Dec. 31, 1929, showed total assets of $4,934,470, and liabilities of only $28,250 and 246,787 shares of stock.

▶ *Minus $259,000.* Aeronautics Branch asks for that amount in the deficiency appropriation bill recently reported before the House. Reason: More employees and greater activities.

▶ *Five-state parley scheduled.* Arkansas, Mississippi, Tennessee, Missouri, Louisiana, Kentucky, and Alabama will send delegates to the first Mid-South Aeronautic Association conference, Mar. 27-28.

▶ *Nearer world mark.* Taking off at approximately 5:38 p.m., Feb. 23, from Point Loma, San Diego, Calif., Hawley Bowlus remained in the air until 2:43 a.m., thereby creating a new American glider-soaring record of 9 hr. 5 min. and nearing the German world record.

Airports and Airlines

▶ *Brown defends bill.* Postmaster General Brown argues for the Watres air mail bill before the House Post Office and Post Roads Committee. Believes aiding passenger lines would increase efficiency of air mail system.

▶ *Ticket report.* Committee of the American Air Transport Association reports on plans for a standard contract between airlines and passengers and a standard ticket form.

N.A.A. Board Plans 20 Projects for 1930

WASHINGTON (D. C.)—On Feb. 12, the Board of Governors of the National Aeronautic Association met at National Headquarters, Barr Bldg., here, under the direction of Sen. Hiram Bingham, president, and outlined a program of activities for 1930. Twenty important projects were planned and are as follows:

1. An intensive campaign of aeronautical education among all classes in order to promote airmindedness.
2. Organization of air tours and air races where such events will serve to further the progress of aviation.
3. Congressional authorization for the air-marking of all post offices and other government buildings where necessary.
4. Suitable state legislation requiring the air marking of all incorporated cities in accordance with the standards of the U. S. Department of Commerce.
5. Urging upon every state and community the establishment of adequate airport and landing facilities.
6. Energetic stimulation of junior aviation activity.
7. Energetic co-operation with civic, social and commercial organizations and aeronautic groups in the development of aviation.
8. Uniform state aeronautical legislation consistent with the federal laws on the subject and in accordance with the recommended legislation set forth in Aeronautics Bulletin No. 18 of the Department of Commerce (i.e. uniform licensing of airmen and aircraft.)
9. Continued development of the air mail system in the United States.
10. The energetic development of international air mail, express and passenger routes, with special emphasis on such routes throughout the Americas.

Want More Plane Carriers

11. Rapid development of private flying clubs and glider clubs.
12. Providing an adequate air defense for the United States and its insular possessions. We believe that the first step in that direction is to complete the Army and Navy Five Year Programs, modified and augmented to meet changed requirements due to changed conditions.
13. Immediate legislation to provide for a just solution of the difficult personnel problems of the Army Air Corps.
14. Construction by the Navy of additional aircraft carriers.
15. Expansion of Army, Navy, and Marine Corps reserve aviation with proper provisions for airplanes and supplies.
16. Government aid for the more rapid development of airship navigation.
17. Continued development of the industrial war plans system.
18. Adequate awards for noteworthy aeronautic achievements.
19. Further development of aviation insurance and the fostering of aviation coverage in general policies.
20. An adequate headquarters building for the N.A.A. in Washington.

Perhaps—But What Of Maneuverability?

ST. LOUIS (MO.)—With all the airmindedness of this city, members of the aeronautical industry who attended the air show are still wondering whether the St. Louis traction company was non-airminded, indulging in an unwonted "poke," or simply jealous. A sign boldly displayed on the city's street cars read: "We take off, fly, and land in all kinds of weather."

Reduce Dayton Bear Price

DAYTON (OHIO)—The Dayton Airplane Engine Co. has announced a reduction of almost 50 per cent in the price of the Dayton Bear four-cylinder, inline, air cooled engine. The new selling price is $750 compared to the former price of $1,450.

New Records Made On Long Distance Flights

NEW YORK (N. Y.)—A new record of 52 hr. 15 min. flying time between here and Buenos Aires, and a new mark for the Miami-Balboa route by air were recently established, reports reaching here state.

The first mark was made by Lieuts. Will W. White and Clement McMullen in a Wasp-powered Lockheed Vega. They left the Newark Airport on Feb. 14 and arrived at their destination on the 19th, the elapsed time for the trip totaling 5 days and 5 hr. Purchased originally by the Standard Oil Company of New Jersey, the Lockheed is now used by Stanavo Specification Board, Inc., of which the New Jersey firm is a member. Stanavo aviation oil and gasoline was used on the trip and the craft was equipped with a special Pan American Airways radio outfit.

Three Army fliers—Lieuts. Albert F. Hegenberger and Ennis C. Whitehead, and Maj. Jacob E. Fickel, Executive Officer of the Materiel Division, Wright Field, Dayton, Ohio—flew from Miami to Balboa, Panama Canal Zone, in 11 hr. 25 min. in a tri-engined Ford. The craft was to be delivered to France Field and it was the purpose of the crew to make a non-stop flight of the 1,200 mi. to be covered, which they did.

Marine Order to Curtiss

BUFFALO (N. Y.)—C. Roy Keys, vice-president and general manager of the Curtiss Aeroplane & Motor Corp., announces receipt of an order for $117,562 in aircraft, accessories, and parts from the United States Marine Corps. The planes will be of the latest type.

General Motors Plans Financing for Fokkers

ST. LOUIS (MO.)—An announcement made public here during the International Aircraft Show declared that a plan had been reached whereby General Motors Acceptance Corp. would finance the sale of Fokker planes on a deferred payment basis. Gavin Breckinridge, head of the aviation department of the General Motors concern, authorized the statement which was made by Roy E. Russell, Fokker sales manager at the show.

"Through the affiliation existing between General Motors Corp. and the Fokker Aircraft Corp. of America, arrangements have been made for the financing of Fokker aircraft on the General Motors Acceptance Corp. deferred payment plan. While this service is now available to purchasers of Fokker aircraft, it naturally will only be extended on a conservative credit basis providing for the full protection of those at interest and, of course, comprehensive insurance will be a requirement of the plan."

The details of the plan provide that a prospective customer must forward his credit and insurance application through the Fokker representatives to GMAC headquarters in New York in order that the insurance rate may be set according to the class of usage in which the planes are to be engaged. Upon approval of these forms planes can be delivered for a minimum down payment of one-third. The entire cost of the first year's required insurance are included in the total purchase price.

Eleven Planes in Omaha Show

OMAHA (NEB.)—It is believed nearly 10,000 persons viewed the eleven planes which were displayed here Feb. 17-22 at the Auto-Aero Show held in the Ak-Sar-Ben Coliseum. Monoplanes were in the majority, there being six of them. A list of the craft exhibited and by whom, is as follows: Kari-Keen coupe, Kari-Keen Aircraft, Inc., Sioux City, Iowa; Stearman, Hanford Tri-State Airlines, Sioux City; Monocoupe and Monoprep, Rapid Aviation Co.; Overland Sport Trainer, Overland Airways, Omaha; Curtiss Robin, Sidles Airways, Lincoln, Neb.; three Travel Airs, the Mid-West Aviation Corp., Omaha; Waco, Pioneer Aircraft Co., Omaha; and Lincoln PT, Lincoln Aircraft Co., Lincoln, Neb.

Deficit for Aero Securities Corp.

BOSTON (MASS.)—Aviation Securities Corp. of New England, reports for the period of incorporation from March 6, 1929 to Dec. 31, 1929, a deficit of $146,487 after a loss on the sale of securities amounting to $210,400. Liquidating value of the 148,130 shares outstanding on Feb. 18, 1930 was approximately $11.23 per share. Investments at cost totaled $2,588,755 as of Dec. 31.

Mid-South Air Group To Confer Mar. 27-28

MEMPHIS (TENN.) — Plans for the development of aviation and air transportation in the Central South will be voiced at the first meeting of the Mid-South Aeronautic Association recently organized under the auspices of the Memphis Chamber of Commerce. This conference will be held here March 27-28. At least one official of the Aeronautics Branch will be on the program of speakers which will include representatives of the various branches of aviation.

Chambers of Commerce, mayors, and others from the seven states to participate in the meeting—Arkansas, Mississippi, Tennessee, Missouri, Louisana, Kentucky, and Alabama—will be invited to attend, as well as governors and congressmen from the interested states.

Temporary officers of the association are Robert Haverty, Memphis, vice-president of the Haverty Furniture Co., president; Anker F. Hanson, Memphis, architect, and a leader in the Mud Island Airport survey, vice-president; John C. Ottinger, Jr., director of the Aviation Division of the Memphis Chamber of Commerce, secretary-treasurer. The executive committee includes W. Howard Stovall, southern manager for Curtiss-Wright Flying Service, Inc.; A. D. Niemeyer, Memphis manager for the Universal Aviation Corp.; and H. T. Dawkins, general manager of the Southern Aviation and Transport Co., Memphis.

Definite assurance has been given of the cooperation of the Tennessee Aeronautic Board, newly established by the special session of the Tennessee Legislature and to which L. W. Hughes and Col. J. W. Canada, both of Nashville, were recently appointed, and of the Memphis Airport Commission, headed by Colonel Canada and Edwin M. Williams, secretary.

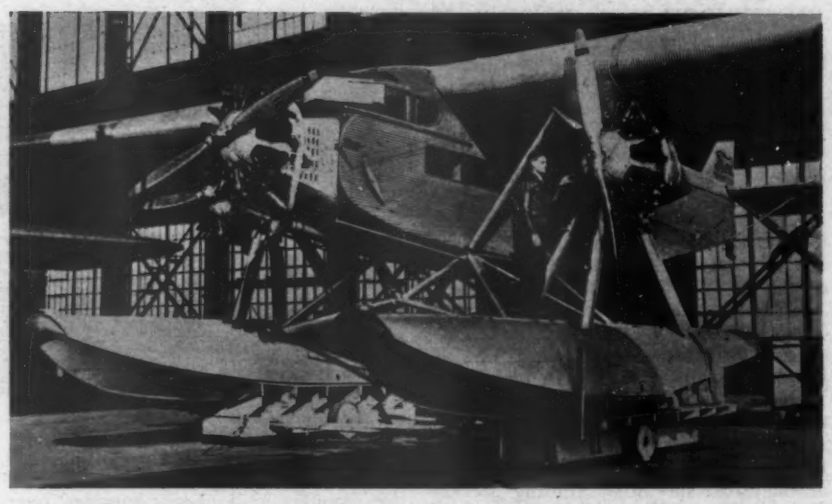
Find Bodies of Eielson and Aide

NEW YORK (N.Y.)—The body of Carl Ben Eielson has been recovered from the wreckage of his plane which crashed last November on its flight from Alaska to the ice-bound motorship "Nanuk" near North Cape, Siberia. The body of Earl Borland, his mechanic, was found a few days previously. Canadian, Russian, and American rescue parties have participated in the search for the lost fliers. Eielson, ranked as one of the greatest among recent explorers, was organizer of the Alaskan Airways, Inc., a subsidiary of The Aviation Corp., of which he was a vice-president.

Cardinal Reduced to $3,985

ST. LOUIS (MO.)—Reduction in price of the Kinner-powered Cardinal two-place cabin monoplane was announced at the show by the manufacturer, the St. Louis Aircraft Corp. The price was lowered from $4,250 to $3,985.

Tri-Engined Ford is Converted into Seaplane



A PICTURE OF the Ford 5-AT plane, at the Philadelphia Navy Yard where it was turned into a seaplane by the installation of floats. The pontoons, each 30 ft. long., were produced by Aircraft Products Corp., Detroit, and are known as type Number A-27000. This craft was later flown to Washington for demonstrations before Navy Department officials. It can easily be converted into a land plane, and can be used as a passenger, twenty-troop transport, bomber, or torpedo carrier. Two torpedoes may be carried.

Report Canadian Air Registration

OTTAWA (ONT.)—Figures given out by the Department of National Defence show that on Jan. 31, there were 354 Private Air Pilots and 333 Commercial Air Pilots, and that licenses had been issued to 306 Air Engineers. Aircraft registered numbered 408, while a total of 71 Air Harbors (airports) were accounted for.

Ex-Cello to Acquire Airparts and Tool Corp.

NEW YORK (N. Y.)—Ex-Cello Aircraft and Tool Corp. is to acquire the Airparts and Tool Corp., following approval of the plan by directors of the latter company. Stockholders will vote on the merger at a special meeting called for March 6. Three-quarters of a share of Ex-Cello will be given for each share of Airparts class A stock while the rate of exchange for the class B Airparts stock will be one-half share of Ex-Cello per share.

Formed in August, 1929, Airparts and Tool Corp. acquired all the assets of the Wayne Tool Co., and H. R. Krueger & Co., both located in Detroit, and later, the Wolverine Screw Co., also of that city.

These different firms are included in Ex-Cello's offer. The Wayne Tool firm produces dies, jigs, tools, and special machinery, as does the Ex-Cello concern, while Krueger manufactures special production machinery and Wolverine turns out such parts as rear-brake camshafts, crank ratchets, and bolts for high carbon steel.

Aircraft Products Buys Holcker Division

ST. LOUIS (MO.)—According to a report issued by the Aircraft Products Corp., of Detroit, the gas tank division of the Holcker Manufacturing Co., Kansas City, Mo., has been purchased and merged with the Michigan firm. Ralph R. Irwin and Clyde W. Holcker, presidents of the concerns, consummated the deal in St. Louis during the air show here.

Clyde W. Holcker has engaged in metal craftsmanship for some twenty-five years, and his firm has manufactured welded aluminum tanks during the past four years for such companies as American Eagle, Travel Air, General Airplanes, etc. Hereafter, all production of the Holcker division will be cared for at Detroit, with Mr. Holcker going on the road for Aircraft Products Corp.

Aircraft Products states that the purchase and move to Detroit is in line with their policy to centralize engineering talent and spread overhead and sales costs over a number of allied aeronautical products.

Boeing Jack Aids Tire Removal

SEATTLE (WASH.) — Boeing Airplane Co. has developed a special jack, incorporated in each inside oleo leg of a Boeing tri-engined transport, to facilitate removing the tire. The landing gear is made of welded steel tubing, with double oleo and drag struts for each wheel. The company is also developing a series of tail wheels to cover all necessary sizes.

Engineering Societies Plan Pittsburgh Meeting

PITTSBURGH (PA.)—During the aircraft show to be held here March 6-15, an all-day session of the Aeronautic Division of the American Society of Mechanical Engineers, and the Engineering Society of Western Pennsylvania, will be held on March 12. The following program has been outlined:

Morning Session. Presiding officer, A. H. Blaisdell, professor of aeronautical engineering, Carnegie Institute of Technology, Pittsburgh. "Development of the Drop Forged Metal Propeller," Frank W. Caldwell, Standard Steel Propeller Co., West Homestead, Pa.; "New Aircraft Instruments," S. J. Zand, aeronautical engineer, and Floyd B. Newell, aeronautical instrument engineer, Taylor Instrument Companies, Rochester, N. Y.; "New Developments in Airport Lighting," H. C. Ritchie, aeronautical specialist, lighting section, General Electric Co., Schenectady, N. Y.

Luncheon meeting. Presiding officer, Norman Allderdice, chairman of the Aeronautic Section, Engineering Society of Western Pennsylvania, and president of Pittsburgh Aeronautic Industries. "The Future of Air Transport," Maj. Thomas Lanphier, Ford, Bacon & Davis, New York, N. Y.; "Safety in Aircraft," Maj. Harold F. Martin, Pittsburgh.

To Discuss Metal Planes

Afternoon session. Presiding officer, Thurman H. Bane, The Aviation Corporation, and member executive committee, Aeronautical Division, A.S.M.E. "Metalizing the Airplane," H. V. Thaden, vice-president, of Pittsburgh Metal Airplane Co., Pittsburgh; "Some Aspects of All Metal Airplane Construction," (with notes on the monocoque type) Wellwood H. Beall, aeronautical engineer, Walter M. Murphy Aircraft Co., Pasadena, Calif.; "Some Aspects of Airplane Design," Schuyler Kleinhans, of the Sikorsky Manufacturing Co., Bridgeport, Conn.; "Trend in Aircraft Engine Design," C. H. Schowalter, aircraft engine division, Lycoming Mfg. Co., Williamsport, Pa.; "The Radiophone in Air Transport," R. H. Freeman, Boeing Air Transport, Oakland Airport, Oakland, Calif.

Will Explain New Instruments

Among the instruments to be described by Mr. Zand and Mr. Newall are the cabin altimeter, sensitive altimeter, statoscope distant indicating jackometer enginge gauge unit, remote control magnetic compass, and remote control magnetic compass with gyro damping. The last four named are new developments, not yet in production.

H. V. Thaden's paper on "Metalizing the Airplane," will deal with the development of all metal structure for the craft, corrugated sheets versus plain, labor costs versus jig costs, gauges and limitations, static testing, and the Department of Commerce requirements. Mr. Beall will give a brief resume of the history of materials used in planes with reasons for using all metal parts. He will outline the procedure of designing metal monocoque craft and make suggestions on the type of material structure to use.

In discoursing on airplane design, Mr. Kleinhans will consider: (1) Relation of speed and load, (2) Relation of cruising speed to stalling speed, (3) Advantages of heavy wing loadings, (4) Relation of wing loading and size.

C. H. Schowalter will analyze the probable aircraft engine requirements and possibilities of the future in the light of the most essential features of the power plants used in the different types of planes today. The application of, and the experiences with air transport radiophones on the West Coast, will be discussed by R. H. Freeman.

Cockpit Cabin Top Tested by N.A.T. on Douglas

N.A.T. IS NOW experimenting with this special cabin top on one of the Douglas mail planes operated over New York-Chicago division. The device is actually a windshield with a cabin section built to fit it. The pilot may slide back the glass at the sides at will; and in case of emergency he may release the safety lock, throw back the cabin top, which is hinged at the rear, and make his exit with a chute. Visibility is said to be good and the resulting warmth a comfort.

Behind the device, the turtle deck has been built up to streamline thinly into the vertical stabilizer, giving a razorback appearance to the whole. It will be noted that no radio mast appears. On this craft, a three-way brace, seen at the top of the stabilizer, is being tried. Wires run diagonally from the brace down into the turtle back.

To Move Hamilton Activities

MILWAUKEE (WIS.)—Definite announcement that the Hamilton Aero Manufacturing Co. plant, now operated as a division of the Hamilton Standard Propeller Corp., of Pittsburgh Pa., will discontinue the operation of its plant here, was made by August H. Vogel, vice-president. The activities here will probably be consolidated with the Pittsburgh division by April 1. The decision on the part of the executives of the United Aircraft and Transport Co., which last year acquired the Hamilton Aero and Standard Steel Propeller companies, was reached because contracts have been let for erection of a large propeller plant in Pittsburgh. This, with the Milwaukee division, would give more manufacturing space than is justified by present demands, it is said.

Craft on Jan. 15 Totaled 9,740

NEW YORK (N.Y.)—In the forty-eight states, Hawaii, and Alaska, 6,645 licensed planes were in operation on Jan. 15, according to the Washington Bureau of the Aeronautical Chamber of Commerce. Adding 3,095 identified craft to the above figure, this means that a total of 9,740 planes of all types were operating on the said date.

Change Prudential Policy To Cover Aviators' Risks

NEWARK (N. J.)—As a result of frequent requests to issue life insurance policies to aviators at ordinary rates, the Prudential Life Insurance Co. of America has decided to do so with the following provisions, states the president, Edward D. Duffield:

"'This policy is issued on the express condition that if it shall become a claim by the death of the insured and if such death shall have resulted from operating, or riding in, any kind of aircraft, whether as a passenger or otherwise, the liability of the company under this policy shall be limited to the net reserve on this policy at that time; any other provisions in this policy to the contrary notwithstanding.

"'These provisions shall also apply to any paid-up policy that may be issued or put in force in accordance with the non-forfeiture provisions of this policy.'"

Cleveland-Detroit Firms to Merge

CLEVELAND (OHIO)—Directors of the Wilcox-Rich Corp. and the Peterson Spring Co., both of Detroit, have voted to merge with the Eaton Axle & Spring Co., of Cleveland. The Wilcox-Rich Corp. has plants in Detroit, Saginaw, Battle Creek, and Marshall, Mich. The company manufactures valves, tappets, piston rings and other parts of gasoline engines, automobiles, airplanes and trucks. The Peterson Spring Co. makes springs for valves, brakes, dies and locks.

New Continental Aero Corporation is Formed

MONTREAL (CAN.)—A new company of the same name has been formed to acquire the business of the Continental Aero Corp., Ltd., and a public offering of stock of the new firm is being made by a local investment house.

The old company was limited to a capital of $50,000 whereas the new corporation will have a $500,000 authorized capital, 20,000 class A shares and 30,000 class B shares being authorized. The former stock will be preferred and cumulative as to dividends, at the rate of $1.50 per share, and participate equally with the latter after the class B stock is paying a dividend of $1.50 per share.

Continental is engaged in general commercial aviation, with operating bases at the St. Hubert Airport, Montreal, and at St. Foye, near Quebec. It operates air taxi and aerial photographic services from these bases and maintains a profitable freight and passenger service to the mining fields of northern Quebec and Ontario. Flying schools are conducted at each base. It also has exclusive selling rights in Canada for Travel Air planes, 19 of which, worth approximately $250,000, were sold last year.

Mileage of the company's planes in 1929 amounted to 175,085 mi., as compared with 30,134 mi. in the previous year, while total flying time amounted to 1,842 hr. as against 355 hr., in 1928. In all, 640 sq.mi. were photographed last year, and passengers carried totalled 5,401 as compared with 622 in 1928. Freight carried amounted to 22,945 lb., as against 721 lb. in the previous year.

The directorate of the new company includes J. M. Alexander, president; A. Sidney Dawes, Stuart Molson, Thomas Hall, L. A. Forsyth, K. C., F. S. McGill and T. R. Enderby.

List Underwriters and Securities

NEW YORK CITY (N. Y.)—Volumes I and II of "American Underwriting Houses and Their Issues," are ready for delivery, according to Otto P. Schwarzschild, the editor of the publication. He states that more than 1,000 American and Canadian investment houses are listed in the journals, which may be obtained from the National Statistical Service, 82 Beaver St., this city. Aviation securities are among the various issues outlined, which are classified as to industries. Offerings of foreign countries are also considered.

Montreal Show April 19-26

MONTREAL (QUE.)—April 19-26 has been decided upon as the date for the Montreal Aircraft Exhibition, which will be held at the Montreal Stadium under the auspices of the Montreal Light Aeroplane Club. The British dirigible R-100 is expected to arrive during the show.

New Douglas Plane Ready Soon

LOS ANGELES (CALIF.)—Flight tests of the new Douglas twin-engined amphibion now under construction in the Douglas factory, are expected to take place in April. This plane, an all-metal, full cantilever, monoplane type, will be Douglas' first entry into the commercial field. The Douglas factory is now working at full capacity on military contracts, with a total of 1,180 employees on the pay roll at the present time.

Courses Offered at 24 Land Grant Institutions

ST. LOUIS (MO.)—Twenty-four land grant colleges give aeronautical courses, while 29 do not, pointed out Prof. W. A. Bevan, of Iowa State College, in an address here during show week. Among other data, it was asserted that 569 students, of which three were women, were enrolled in the various courses offered, according to a check made in May, 1929, with instructors totaling 46.

Graduate aeronautical courses in these institutions numbered five, with eighteen graduate students enrolled. Thirteen of these eighteen were studying at Massachusetts Institute of Technology. Of the 24 colleges giving courses, four are doing research work.

Such schools at New York University, The University of Michigan, Stanford, etc., were not included under the head of land grant institutions because of major derivation of backing from the Guggenheim Fund.

F.A.I. President Coming to U.S.

WASHINGTON (D. C.)—Count de la Vaulx, president of the Federation Aeronautique Internationale, will visit the United States in March as part of an extended air tour which he has just begun. In 1905 the Count came to this country to organize the Aero Club of America, fore-runner of the N.A.A., and has not returned since then. Leaving France in the middle of February, Count de la Vaulx plans to fly to Buenos Aires; and after visiting the principal cities of South America, he will fly from Panama to Miami via Pan American Airways. Other American lines over which the Count will fly are Canadian Colonial Airways and the New York, Rio and Buenos Aires Line. On his return trip, Count de la Vaulx will fly from Natal, Brazil, to Africa, and thence to France.

Stanley Tool Absorbs Ajax

NEW BRITAIN (CONN.)—The Stanley Electric Tool Co., subsidiary of the Stanley Works, announces the purchase of the trade name, stock on hand. tools, jigs, fixture, etc., of the Ajax Electric Hammer Corp., of New York. Manufacture of the combined line, to be known as Stanley-Ajax, will be carried on at the Stanley plant here.

Air Investors Issues Balance Sheet for 1929

NEW YORK (N. Y.)—Air Investors, Inc., has issued a balance sheet which showed the company investments, at cost, of $4,465,088, and total assets of $4,934,470, as of Dec. 31, 1929. Liquid assets showed a declination of 41 per cent from the year's high, the report revealed, but there was a recovery of 19.5 per cent from the 1929 low to Feb. 4.

Harvey L. Williams, president, stated that with the exception of payable subscriptions, amounting to $28,250, Air Investors had no other liabilities other than 81,663 shares of convertible preference stock, and 165,124 shares of common stock. After all expenses and taxes, the corporation had a net income for the year of $125,568, while there was a surplus of $136,044.

The market value of securities owned having a quoted market on Feb. 4, 1930, was $2,178,644, equal to $26.80 per share of convertible preference stock. Securities not having a quoted market cost the corporation $772,469. Including securities having a quoted market at market, securities not having a market at cost, cash, and net current assets, the convertible preference stock had an asset value of $37.35 per share on Feb. 4.

Buys Stock for Retirement

If all shares of convertible preference stock were converted into common stock there would then be outstanding 327,650 shares of common which would have an asset value of $9.30 per share. In view of low quotations prevailing for the convertible preference stock, the corporation reports that it had purchased for retirement, up to Jan. 31, 1930, 6,200 shares in the open market.

During the last two months of 1929 securities were sold at a loss in order to reduce the substantial surplus accumulated earlier in the year from sales of securities at a profit. This policy did not affect the value of the corporation's total assets but did save the company a substantial amount in federal income tax.

Tri-State Show Sanctioned

NEW YORK (N. Y.)—The Aeronautical Chamber of Commerce has awarded a Class "C" sanction for the Tri-State Aircraft Show to be held in Convention Hall, Camden, N. J., April 18-26. Delaware, New Jersey, and Eastern Pennsylvania distributors interested in the event are asked to communicate with L. D. Odhner, manager, who is also executive secretary of the Camden Chamber of Commerce.

Bendix Dividend Payable April 1

CHICAGO (ILL.)—Bendix Aviation Corp. announces the regular quarterly dividend of $.50 per share on capital stock has been declared, payable April 1, to stock of record March 10.

Want Plane Bonding Law in Canada Changed

TORONTO (ONT.)—Changes in the methods of bonding airplanes presented to the flying clubs throughout Canada by the Federal Government under its membership scheme were discussed at the annual meeting of the Toronto Light Aeroplane Club. The proposed changes will be further discussed by the Canadian Flying Clubs' association and then be forwarded to the Department of National Defence.

Under the present scheme, a bond of $1,000 has to be posted by any club before it receives a plane. In the event of a complete wreck, or destruction of the plane by fire, the bondsmen who furnish the $1,000 must pay for a new plane to replace the one destroyed. No recognition of the plane's service or condition before it was destroyed is taken into consideration and the bondsmen are forced to act as though it had been a new craft.

It is proposed to have the government take this into consideration—to compute the number of flying hours in the life of a plane so that in the case where a plane has delivered its full quota of service, the bond will not be forfeited in event of the plane's loss.

Capt. Earl Hand was re-elected president of the club at the business meeting while Norman Irwin was elected vice-president, J. Crang, F. Sharp, J. D. A. MacDonald, E. French, H. McKeen and A. Flack, directors, and Harold Burley, secretary.

More Planes for Reserve Pilots

WASHINGTON (D. C.) —Maj.-Gen. James E. Fechet, Chief of Air Corps, has ordered that twenty service type planes be added to the number now available for Reserve Corps pilots at Reserve bases, and it is expected each field will get one. With the addition of these new type service observation craft to those already used by the observation units, it is expected there will be a sufficient number to provide for the needs of Reserve pilots during their flying periods each year. Only Reserve Officers who are qualified to handle service type machines will be allowed to pilot the new craft.

Name Swallow Board Members

WICHITA (KAN.) — W. M. Moore, president of the company; J. W. Craig, treasurer; George R. Bassett, secretary and general manager; Earl Hutton, vice-persident; G. A. Stearns, and Roy A. Streeter now compose the Swallow Aircraft Co. board of directors, following a meeting of the firm officers. The last three named are new members and were among five Wichita men who were original Travel Air stockholders and recently purchased large interests in the Swallow concern. It is intended to go into increased production on the Swallow Training plane.

Another Record For Hawley Bowlus

SAN DIEGO (CALIF.)—It's become almost a habit with W. Hawley Bowlus to break the American gliding-soaring record. Now he's done it again. It was daylight when he took off, but there weren't many people stirring when he came down. It was on Feb. 23, and he started his flight from Point Loma at about 5:38 p.m. and stayed up until 2:43 a.m. or for 9 hr., 5 min. This flight is also said to be the longest night trip in a glider.

Irving Profits Increase

BUFFALO (N. Y.)—The Irving Air Chute Co. reports a net profit of $452,672 for 1929, equal to $2.16 per share on 209,000 outstanding capital shares. Earnings for 1928 were $414,376.

Barber & Baldwin Adds To Its List of Companies

NEW YORK (N.Y.)—Barber & Baldwin, Inc., announce that they have been appointed as underwriting agents for aviation insurance by the North British & Mercantile Insurance Co., Pennsylvania Fire Insurance Co., Commonwealth Insurance Co., Mercantile Insurance Co., Homeland Insurance Co., Northern Assurance Co., and the London & Scottish Assurance Corp.

To furnish the agents of each of the companies comprising the North British & Mercantile and the Northern Assurance Groups with facilities for issuing comprehensive policies, covering in one form all the hazards to which an aircraft is subject, arrangements have been made for each of these companies to issue combination aviation policies with the Aero Indemnity Co., which has specialized in aviation coverages since its incorporation.

The Dec. 31, 1929 statement of the Aero Indemnity, as filed with the Insurance Department of the State of New York, shows a surplus to policy holders of $1,912,230.

Graduate 95 From Kelly Field

SAN ANTONIO (TEX.)—A class of 95 officers and cadets has been graduated from the Advanced Flying School, at Kelly Field. Eighty members of the class, including fourteen regular Army officers, will leave for active duty, five of whom have been assigned to the air base in Panama. Fifty-five graduates of the Primary Training School, at Brooks Field, and 43 from March Field, Calif., will enter the advanced training course at Kelly Field.

Sikorsky Engineering Unit to be Ready Shortly

BRIDGEPORT (CONN.) — Construction work on the new engineering laboratory building of Sikorsky Aviation Corp. is progressing rapidly and will be ready for occupancy before April 1, company officials report. Located just across the factory runway on adjoining property, this division will cover a floor area of 48,000 sq.ft., and will have three distinct parts. There will be a large bay with a 120-ft. span, 25 ft. clear headroom, and 175 ft. in length; machine shop and stock room, office, and first aid station; and a test laboratory, with engineering offices and drafting rooms.

It is planned to operate the engineering building as a complete factory unit with its functions entirely separate from the main plant. Here all the experimental functions of the company will be carried on under the direct supervision of Igor Sikorsky, vice-president. Much of the work to be done on the S-40, 41-passenger amphibion under contract construction for Pan American Airways, will be carried on in the new building, it is understood.

Of brick and steel construction, the new structure will cost completed in the neighborhood of $200,000. Sound-deadening material is used in ceilings of offices and drafting rooms. A model museum and aeronautical engineering library will be among the features.

North American Buys Tool Firm

NEW YORK (N. Y.)—North American Aviation, Inc., a holding company with a paid-in capital and surplus amounting to $25,000,000 announces it has purchased all the common stock of the Ford Instrument Co., Long Island City, N. Y. The transfer of control involved more than $3,000,000, reports state. The Ford company, manufacturers of precision tools, will be operated as a separate unit with Hannibal C. Ford as president. Mr. Ford, who founded the company fifteen years ago, has acted heretofore as vice-president and chief engineer. North American Aviation also owns the Sperry Gyroscope Co., Inc., having purchased it about a year ago.

Aviation Bill Up in New Jersey

TRENTON (N. J.)—If a bill introduced in the House of the State legislature by Assemblyman Frank Durand, Monmouth, is finally approved, supervision of aviation in New Jersey will be placed in the hands of the Board of Commerce and Navigation. The joint conference committee of the legislature was asked to approve the measure, but deferred action on the bill. A study of the needs for the regulation of aviation is now being made by a commission created by the legislature, but direct control has as yet not been vested in any state agency.

Schools and Colleges

BEVERLY AERO CLUB, Beverly, Mass., announces an enrollment of twenty students in its new ground school at the Beverly Airport under the direction of Alton McNeil. Flying instruction will be begun in the spring.

BOEING SCHOOL OF AERONAUTICS, Oakland, Calif., is building a small wind tunnel. The school also announces that it will give practical instruction in radio communication and aerial surveying, and that an additional building, 90x150 ft. is being planned to house welding, engine laboratory, doping, mechanical drawing, and communications instruction.

CENTRAL AIR COLLEGE, Wichita, Kan., has been incorporated for $100,000 by a group of Wichita business men and will replace the Universal Flying School there, whose equipment and leases have been purchased by the new organization. New Equipment has been acquired and a new type of instruction called the "cadet system" will be begun immediately, it is announced.

CHEYENNE AIR SERVICE, INC., Cheyenne, Wyo., announces that high school credits are now being given for courses completed in its aviation school by arrangement with officials of the local school board.

SYRACUSE UNIVERSITY, College of Applied Science, Syracuse, N. Y., has opened a new department of aerial mapping and navigation under the direction of Prof. S. D. Sarason. The course was made possible by an appropriation of $30,000 from the Daniel Guggenheim Foundation.

ERIE FLYING CLUB, INC., Erie, Pa., is sponsoring a course in aeronautics to be given under the direction of Neil McCray, and to consist of a series of 24 lectures as well as actual practice in operation and construction of aircraft.

UNIVERSITY OF MIAMI, Miami, Fla., has received formal orders from the U. S. Navy establishing a Naval Reserve Aviation station there. Fred H. Given, instructor in aviation at the University, has been commissioned as Commanding Officer of the new aviation division.

UNIVERSITY OF MINNESOTA, Minneapolis, is offering evening courses in aviation in its Extension division.

NORTHERN AIRWAYS, INC., Wausau, Wis., announces a ground school to be in charge of H. P. Whittel, formerly of the Weeks Aircraft Corp. of Milwaukee. Flying instruction will also be given.

PIONEER AIRCRAFT CO., Omaha, Neb., is opening its new ground school in the *World-Herald* Building, with J. H. McDonough, a former Marine Corps instructor, as chief instructor. Classes will meet on three evenings a week.

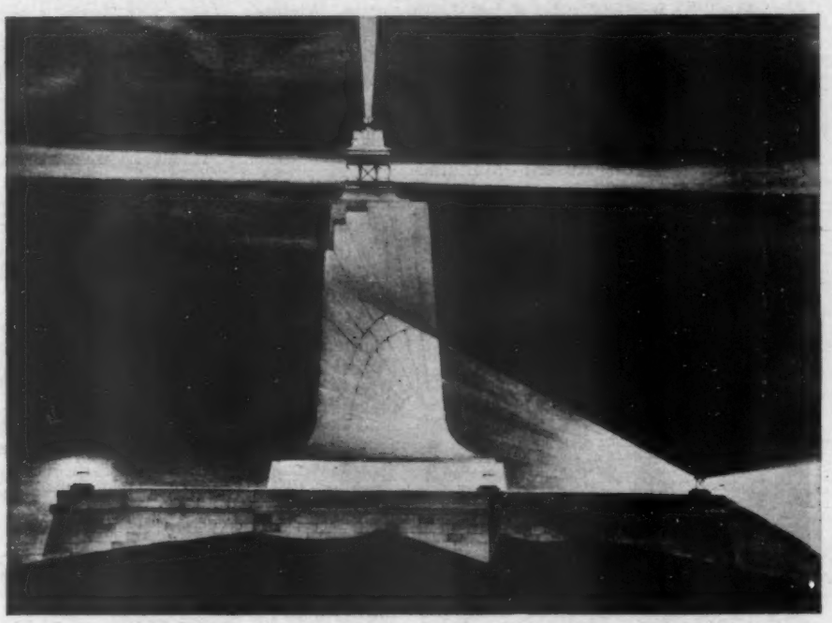
SOUTHWEST AIR SERVICE, Baytown, Tex., plans the establishment of a Tri-City Flying School for Baytown, Goose Creek, and Texas City, Tex., with Jim Davis, chief pilot of the company, in charge.

STANDARD FLYING SCHOOLS, Los Angeles, has started a new class in its advanced transport course, which consists exclusively of training in tri-engined aircraft and includes cross country and night flying. A prerequisite of the course is that applicants must already hold a Department of Commerce transport license.

UNIVERSAL FLYING SCHOOL, Fairfax Airport, Kansas City, Kan., has started a special class for women.

UNIVERSITY OF WISCONSIN, Madison, Wis., is offering courses in aviation meteorology and aerial navigation in its Extension division.

The Winning Design for the Kitty Hawk Memorial



THIS DRAWING, SUBMITTED by Robert P. Rodgers and Alfred E. Poor, New York architects, has been selected for the memorial which is to be raised at Kitty Hawk, N. C., in recognition of the Wright brothers' early flights and pioneering in aviation. Thirty-five designs were submitted in open competition to a jury of award recommended by the American Institute of Architects. Patrick J. Hurley, Secretary of War, recently approved the selection made.

Plane Again Stops Bank Run

PANA (ILL.)—Again an airplane has proved "the friend in need" of a bank on which a run had started. Following the closing of the H. N. Schuyler State Bank here, depositors began withdrawing funds from the Pana National Bank and caused president C. P. Parris to telegraph for $250,000 in cash from the Chicago Federal Reserve Bank. In two hours' time, a plane arrived with the cash and restored normal business conditions at the threatened bank.

Plan Cessna Capital Increase

WICHITA (KAN.)—Capital of the Cessna Aircraft Co. will be increased from $500,000 to $1,000,000 if plans are approved at a stockholders' meeting. Controlling interest of the company now lies in the hands of the Shawmut Corporation and eastern financiers.

Aero Branch Queries Schools

WASHINGTON (D. C.)—A survey of approved flying schools is being conducted by the Aeronautics Branch to enable officials to answer the questions constantly being received from would-be students throughout the country. In the questionnaire sent out to each school, an attempt was made to find out the cost of the course, the average time length, the number of students who qualify, and their chances of obtaining employment after graduation. Schools were also queried on their attitude toward part time instruction. Returns at this time have been received from approximately 55 per cent of the schools.

N.A.T. Testing Sperry Horizon

CHICAGO . (ILL.) — National Air Transport is continuing a series of Blind flying tests with the Sperry Horizon from the N.A.T. operations base at Chicago Municipal Airport. The tests have been highly satisfactory, according to E. P. Lott, manager of operations, who, with Frank H. Burnside, chief test pilot, has been flying an N.A.T. Douglas cargo transport equipped with the Sperry device on regular runs.

Six-Plane Order for Curtiss Reid

MONTREAL (QUE.) — The Curtiss Reid Aircraft Co., Ltd., reports an order for six planes, costing a total of $31,824, to be used for training at Camp Borden.

PERSONNEL

HARLAN A. GURNEY has resigned as operations manager of the Cleveland terminal of Universal Air Lines. He is succeeded by ROY L. MITCHELL. HAROLD W. OTTO has been made co-pilot on Universal's Cleveland-Kansas City route.

A. C. PAYNE has been appointed sales engineer for Russell Manufacturing Co., Middletown, Conn., makers of Rusco aviation products. Mr. Payne was formerly engineer with Parks Air College.

T. B. CLEMENT, formerly general traffic manager for Transcontinental Air Transport, has been officially appointed general traffic manager for T.A.T.-Maddux Lines by J. L. Maddux, president.

T. B. Clement

TRUMAN GILE, recently director of Universal Flying School at Kansas City, Mo., has been made director of Embry-Riddle Company's ground school at Cincinnati, Ohio.

W. A. WILLIAMS has been made northwest sales director of Detroit Aircraft Corp., with headquarters in Portland, Ore., and territory including Oregon, Washington, Idaho, Utah, Montana, and western Canada. TEX RANKIN, former distributor, will be associate distributor in Portland.

HERBERT KINDRED, formerly with N.A.T., has been made reserve pilot for Southern Air Transport, and will be stationed at Dallas, Tex. SHERMAN WILLARD has returned to service with S.A.T. on the Houston-San Antonio line.

HANS MIROW has been named co-pilot for West Coast Air Transport, on the Portland-Seattle line. He is a recent graduate of Rankin School of Flying.

LIEUT. HOWARD FEY is now pilot on the Pasco-Boise section of Varney Air Lines. RUSSELL VOORHEES has been made service manager for Varney Air Lines, with headquarters at Portland, Ore.

LOWELL YEREX has been appointed chief pilot for Transportes Aeros Transcontinentales, Mexico.

CARLTON W. GRIFFIN, recently district traffic manager of Colonial Western Airways, Inc., at Rochester, N. Y., has joined the sales staff of Curtiss-Wright Flying Service at Buffalo, N. Y.

CHARLES A. HAYNES has been made manager of the transmission structures division of Truscon Steel Co., Youngstown, Ohio.

F. J. REYNOLDS has been made chief inspector of Spartan Aircraft Co., Tulsa, Okla., and C. R. HORTON has been made inspector. Mr. Reynolds was formerly with the materiel division of the U. S. Army Air Corps, New York, N. Y.

E. B. FRICKS, senior pilot of Interstate Airlines, Inc., has been transferred to Tennessee's Sky Harbor, Murphreesboro, as director of school instruction and maintenance. NORMAN WISE, chief pilot at the school, will replace him as mail pilot.

W. A. MOORES, formerly branch manager for S.A.T. at Houston, Tex., has been appointed operations manager for Houston Main Street Airport, Inc. H. B. NAYLOR, formerly assistant, will succeed Mr. Moores as S.A.T. branch manager.

BENJAMIN J. BUSH has been appointed director of sales at the Los Angeles branch of Curtiss-Wright Flying Service.

BARTLETT STEPHENS, recently acting superintendent of Mills Field, San Francisco, has joined the staff of Air Ferries, Ltd., as pilot. SAM METZGER has been appointed chief of maintenance for the company.

K. M. KRIEGER has been made chief pilot for Acme Aircraft Co., Rockford, Ill.

H. WEIR COOK, general manager of Curtiss-Wright Flying Service of Indiana, has been re-elected president of Indiana Aircraft Trades Association.

TREVOR G. WILLIAMS has been appointed manager of Northern Airlines of Universal Aviation Corp., with headquarters at Chicago.

ROBERT A. TROW has been added to the aviation department of Behrendt-Levy Insurance Agency, Inc., Los Angeles, Calif., as technical advisor.

E. G. HOTCHKISS has been appointed store manager for Curtiss-Wright Flying Service at Dallas, Tex.

E. HALE has been appointed district passenger agent for Western Air Express at Albuquerque, N. M.

RUSSELL A. CONE has been appointed chief instructor of the Curtiss-Wright Flying Service school at Grosse Ile airport, Detroit, Mich. JOSEPH DUCKWORTH, former manager, will become manager of the Curtiss-Wright school at Atlanta, Ga.

FOYE SHUMAKER has joined the staff of Detroit Aircraft Corp.

ROBERT J. MATTHEWS has joined the staff of Curtiss-Wright Flying Service at Columbus, Ohio.

HUGH WOOD is now instructor for Airways Transport Co., Tampa, Fla. He was formerly chief test pilot for American Eagle Aircraft Co.

A. P. MCCULLOUGH, recently sales manager for the Universal school at Oklahoma City, has been appointed to the same position in St. Paul, Minn.

F. E. TAFOYA, Portage Hotel, has been appointed Akron representative of Stout Air Lines.

E. C. KLOEPFER has been appointed director of student enrollment at Ohio State School of Aeronautics, with headquarters at Columbus airport. The company conducts schools in Zanesville, Springfield and Crestline.

MAX LA PORTE has become a member of the mechanics staff of Curtiss-Wright Flying Service at St. Louis.

HAROLD MCMICKLE, pilot, has been transferred from Compania Mexicana de Aviacion to Pan American-Grace Airways in Peru.

FOSTER V. JONES has been added to the weather bureau staff at Albany, N. Y., which includes GUSTAVE S. LUNDGREN, director, ARTHUR E. LANE and JOHN N. COHEN.

E. K. CAMPBELL, manager of Curtiss-Wright Flying Service at Moline, Ill., has been made regional sales manager for Curtiss-Wright Sales Corp., with territory including Illinois, Indiana, Iowa, Nebraska, Minnesota, Wisconsin, North and South Dakota. L. R. HEATH succeeds him as manager at Moline, where he will continue to have his headquarters.

CHARLES W. DENNIS has resigned as traffic superintendent of the eastern division of T.A.T.-Maddux lines.

F. E. BRADFIELD, formerly vice-president and general manager of Velie Motors Corp., has been appointed general manager of Szekely Aircraft & Engine Co., Holland, Mich.

CHARLES CAIN has been promoted to the position of field manager for T.A.T.-Maddux Lines at St. Louis, Mo. He is succeeded as field manager at Indianapolis, Ind., by C. A. WILLIAMS.

PROF. A. H. BLAISDELL, head of the mechanical and aeronautical engineering departments, Carnegie Institute of Technology, Pittsburgh, Pa., has been appointed chief technical advisor of Franklin Aircraft Corp., Franklin, Pa.

MAJ. JOHN H. JOUETT, in charge of air forces at Fort Crockett, Galveston, Tex., has resigned from the army to take charge of Standard Oil Company's air fleet at Menfee Airport, New Orleans, La.

CARL T. BETTS, manager of Curtiss-Wright Flying Service at St. Louis, has been made assistant to David Visel, vice-president, in New York. He will be succeeded by MAJ. JAMES K. TULLY, manager of Curtiss-Steinberg airport.

MAJ. GEN. PRESTON BROWN, commander of the First Corps area at Boston, will become deputy chief of the Army, succeeding MAJ. GEN. BRIAN H. WELLS, who has been assigned to command of the First Division at Fort Hamilton, New York.

Stinson and Ford Approved

WASHINGTON (D. C.)—Two more approved type certificates have been awarded to the following craft, according to certificate number, make and designation, type, power plant, weight empty, useful load, and gross weight: No. 295—Stinson SM-8A Junior, four-place closed monoplane, Lycoming R-680, 2,061 lb., 1,134 lb., 3,195, lb.; No. 296—Ford 5AT-CS, fifteen-place closed seaplane, three Wasps, 8,675 lb., 4,825 lb., 13,500 lb.

BRIEFLY

Flight Lieut. Ogilvie Forbes, of the Canadian Royal Air Force, and Capt. Carlos Lumsden, of Curtiss-Reid Airways, Ltd., recently completed a round trip from Montreal to Mexico City in a Curtiss-Reid Rambler, covering about 7,000 mi. in two weeks.

Golden Eagle Aircraft Co., Los Angeles, Calif., will move its plant immediately to Columbus, Ohio, according to an announcement by President R. O. Bone. Initial production schedule will be ten planes per month.

A Curtiss Robin and a Curtiss Fledgling, both powered with Challenger engines, recently were flown over the Andes from Buenos Aires to Santiago, Chile.

Quantity production will be started March 13 at the new $2,000,000 plant of Horace E. Dodge Boat & Plane Corp. at Newport News, Va.

A Fairchild cabin monoplane is being used by Bolivia Gold Exploration Co. for transporting gold ore across the Andes.

Tennessee Gliders Association has asked for a charter at Nashville, Tenn.

Great Northern Aviation Corp. has offered the use of its shops and the services of its mechanics free to any glider club organized at Duluth, Minn.

Fiscal Service Corp., 2 West 45th St., New York, N. Y., has been appointed publicity representative of American Motorless Aviation Corp.

A special jack which is part of the oleo gear has been developed by Boeing Airplane Co. to facilitate changing tires on the Boeing tri-engined transport plane.

Aerotopograph Co. of Washington, D. C., has completed photographing 36 sq.mi. on Black Warrior River, Ala., under contract for the War Department, and maps are now being made from the photograph.

Southwest Air Services, distributors of Waco planes in southern Texas, has announced plans for promoting the organization of private flying clubs.

Courier Monoplane Co., Long Beach, Calif., is said to be planning erection of a plant at Pomona, Calif.

Tungsten Electric Corp., manufacturers of tungsten and molybdenum products for various purposes including use in aircraft, has acquired control of Eisler Electric Corp., New York, N. Y.

Amphibian Corporation is said to be considering Elsinore, Calif., as a suitable place to establish a factory.

Mitchel Field, L. I., N. Y., is to have a 30-piece band from the Coast Artillery of the First Corps Area.

Arrow Aircraft & Motors Corp., Havelock, Neb., has installed a special saw for cutting steel tubing as part of a general stockroom rearrangement.

Sales of three Barling NB-3 monoplanes in Winnipeg, Manitoba; four in Texas; and one in Kansas City, Mo., have been reported recently by Nicholas-Beazley Airplane Co. The Montgomery, Ala., distributor has signed a contract for twelve planes.

A bill to give control over registration and regulation of aircraft to the State Board of Commerce and Navigation has been introduced in the New Jersey legislature.

Plans are now being made for the Northwest Air Tour to be held this spring, under the auspices of the Portland, Ore., chapter of N.A.A.

New Firms Announced

AERO PACIFIC CORP., LTD., Los Angeles, Calif.; capital stock, $15,000; by R. E. Huse, J. A. Jarvis, J. L. Liscom, R. D. Loose, and Mr. Franz.

PARKIN AIRSHIP CORP., Los Angeles, Calif.; capital stock, $10,000; by Harry W. Parkin, James J. Ruple, B. H. Nelson, S. A. Woodford, Oscar M. Kiess, and others.

AERONAUTICAL CALENDAR

May 27-30	All-New England Air Tour, starting from Springfield Airport, Springfield, Mass.
June 28	Annual R.A.F. Display, Hendon, Eng.
	EXPOSITIONS
Mar. 6-15	Second Annual Aircraft Show of Aero Club of Pittsburgh, Pa. Ray Krimm, director, William Penn Hotel.
Mar. 22-29	Second Annual Aviation Exposition, Buffalo, N. Y.
Mar. 26-Apr. 1	Cincinnati Aircraft Show, Music Hall, Cincinnati, Ohio, Headquarters, Hotel Sinton.
April 5-12	All-American Aircraft Show, Detroit.
April 18-26	Tri-State, Aircraft Show, Convention Hall, Camden, N. J. L. D. Odhner, executive secretary, Hotel Walt Whitman Annex.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.
July 6	International Transportation Exposition, Warsaw, Poland.
	MEETINGS AND CONFERENCES
Mar. 5	New York State Airport Conference, Auspices A. C. of C., Mark Twain Hotel, Elmira, N. Y.
Mar. 17	Regional Airport Conference for New England, Providence, R. I.
Mar. 27-28	Mid-South Aeronautic Association Convention, Auspices Chamber of Commerce, Memphis, Tenn.
Apr. 8-9	Meeting of Society of Automotive Engineers, Detroit, Mich.
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N. Y.
July 3-5	Western States Aeronautical Conference, Medford, Ore.
	AIRPORT DEDICATIONS
Mar. 3-4	Vero Beach, Fla., Dedication and Meet.
Mar. 8	Gulfport, Miss.
Mar. 10	Titusville, Fla., Municipal Airport.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield, Mass.

TRADE TIPS

It has been reported that

Richfield Oil Co. of California, Richfield Bldg., Los Angeles, desires literature from manufacturers and dealers selling materials and specialties used in the construction of airplane hangars and airports. Information should be sent to Mr. Curtis, department of aviation.

Materials will be purchased for development of the municipal airport at Regina, Sask.

Plans for enlarging the airport at Newburyport, Mass., are being made by James Dickens, president of Merrimac Valley Airways, who is also in the market for one or two training planes.

A syndicate headed by Hollis Plimpton of the Norwood, Mass., Chamber of Commerce will construct a 1,000-acre airport this spring near that city.

Ace Aircraft Manufacturing Corp., Wichita, Kan., is appointing dealers for the Baby Ace plane.

Florida Airport Corp., Dunedin, Fla., is in the market for machine equipment for use in the new company hangar.

City Council of Little Rock, Ark., has authorized purchase of land for a municipal airport and construction of hangars and administration building.

City Council of Hanford, Calif., has called for bids for erection of hangars at the municipal airport.

Common Council of Newark, N. Y., has appointed Karl Herman to negotiate the leasing of the municipal airport to private interests.

Representatives Named

ARROW SPORT—Northwest Air Service, Bryn Mawr, Seattle, direct regional representative.

BENDIX—Joseph Woodwell Co., Pittsburgh, Pa., exclusive distributor in western Pennsylvania and northern West Virginia for Bendix drives and brakes, Bendix-Cowdrey brake testers, and Stromberg motor devices.

CURTISS-WRIGHT — Barnes Flying Service, Holyoke, Mass., through East Coast Aircraft, Boston, Mass.

DETROIT AIRCRAFT CORP.—Ponder Aircraft Corp., Fort Worth, Tex., territorial representative for practically the entire line of planes offered by D.A.C.

FAIRCHILD—J. B. Alexander, Los Angeles, Calif.; Arizona Air Services, Inc., for the state of Arizona; Interstate Flying Corp., Philadelphia County, Pa.; North Penn Airways, Inc., Monroe County, Pa.; Robert J. Stewart, Baltimore County, Md.; Veale Aviation, Inc., Luzerne County, Pa.

SPARTAN SCHOOL OF AERONAUTICS—The American School of Welding, Inc., St. Louis, Mo.

STINSON—Charles Dallas, Buffalo, N. Y.; distributor for western New York.

AIRPORTS AND AIRLINES

Brown Defends Watres Mail Bill

Explains Passenger Line Assistance Plan at Hearing

WASHINGTON (D. C.)—"The present air mail law does not directly promote the major purpose of all legislation of this country in respect to air transport—that is, to encourage the habit and practice by the public of using aviation in the ordinary affairs of life," declared Postmaster General Brown in the hearing held on the Watres air mail bill by the House Post Office and Post Roads Committee Feb. 19. "In this transition period we think it necessary to give some aid to passenger lines, particularly when by so doing we can increase the efficiency of the air mail service," Mr. Brown continued. "If we do not give some assistance at this time all the money we have spent on this activity in the past will be lost, and, what will be an even greater deprivation to the country, the experience of these pioneers will be lost." The increased cost to the government in payments made to passenger lines for the transportation of mail would not total more than $2,500,000 more than the present appropriation, in the estimation of the Post Office Department.

Payment Methods Compared

In answer to questioning by Representative Clyde Kelly of Pennsylvania, Mr. Brown stated that during October, 1929, the last normal flying month, 1,303,938 miles were flown and the contractors were paid $1,341,981. Contrasted with that figure is an estimate of $1,073,604 for the same distance if figured on the basis of space and mileage. Estimated expense of $230,733 for proposed routes, and $66,159 for payment to passenger lines would bring the approximate monthly expense to $1,370,496. What rates the Post Office Department has in mind have not been disclosed, although Mr. Brown stated that he probably would not place more than a maximum of 50 or 100 lb. on passenger planes, at rates anywhere between $.10 and $.30 a mile. Compensation would be allowed on the three variables of night flying, fog, and mountainous terrain.

Mr. Brown made the following points in testifying to the necessity of passing the Watres bill:

There is no uniformity of compensation at present when payment is based on poundage without regard to distance. An inducement is created in the present bill to contractors to swell their volume by unethical practices, with the result that material is sent by air which might be as well transported by other means.

The air mail map has grown by degrees, and as it now stands is illogical. The certificate feature in the present bill, unless in combination with other provisions as in the Watres bill, would fasten this map upon the country for the next ten years.

Equities of pioneers should be recognized. The experience of these operators is a national asset in the development of aviation for national defense. Any scheme that throws this experience overboard is unsound.

It is not good business—in fact it is not fair—to make the air mail operator gamble on the amount of mail he will have to carry from day to day.

The aid extended to passenger lines would not be great, but would be enough to keep the men in the air until they solve their problem. It would be concentrated upon the "natural routes."

More air mail contractors are losing money on their contracts than are making it (based upon their financial statements shown the Post Office Department). Only one concern in the whole industry has ever paid a dividend to stock holders.

In discussing the provision over which much dissension is expected in the House—that of contract by negotiation rather than exclusively by competitive bidding—Mr. Brown stated that he did not desire to abandon the principle of open bidding, but that he knew no other way of saving to the country the experience of these operators over the last ten years. If thrown open to competitive bidding operators without substantial backing and experience would be able to underbid experienced companies, and all the work of the past ten years would have to be done over again.

Another provision which was under fire was that allowing the utilization of excess contract space for the transportation of such mail matter as the Postmaster General might authorize. Mr. Brown stated that there was no intention of carrying public mail other than air mail in such space.

The present air mail postage of $.05 is too low, but no increase is considered for the present because of the belief that the poundage would fall off.

Col. Paul Henderson of N.A.T. presented detailed figures on his company's financial condition since its inception. In 1926 $360,000 was spent in expenses (exclusive of capital investment) as opposed to $180,000 revenue received; 1927, $785,000 against $580,000; 1928 (when postage was reduced from $.10 to $.05) $1,420,000 against $1,685,000; 1929, $1,900,000 against $2,600,000. Contrasting 1926 and 1929 cost (in

(Concluded on page 462)

T. A. T. Adds Two Condors

COLUMBUS (OHIO)—Purchase of two additional eighteen-passenger Curtiss Condor transports for the T.A.T.-Maddux lines at Port Columbus has been announced. The planes were bought to care for the increase in travel brought about by recent reduction in fares. Their delivery will increase the number of Condors operating from the port to four. Cabins of the new Condors have been rearranged to improve visibility for the passengers, and the engine nacelles have been moved forward so that the propellers do not come opposite any of the passenger seats. The baggage room and lavatory have been moved from the rear of the cabin to the space between the wings and seats have been placed in their former position so that passengers may enjoy a view much less obstructed by the lower wing and engines.

Standard Contract And Ticket Proposed

CHICAGO (ILL.)—Following up the movement launched here in January by members of the American Air Transport Association to standardize and consolidate ticket forms and schedules, a committee has issued a report on its study of the establishment of a standard ticket for all lines in the Association [See AVIATION for Jan. 11, page 78.] The committee consisted of J. W. Brennan, of T.A.T.-Maddux, chairman; R. A. Bishop, Col. H. H. Brittin, Howard H. Wikoff and Winsor Williams, manager of the Association.

The chief recommendation was a standard contract between the air transport company and the passenger. This is as follows:

In consideration of the issuance to me of this ticket for transportation, I hereby agree as follows:

ONE: (1) That said ticket represents a revocable license and that the company or companies represented herein may, with sufficient cause to it or them, decline to carry me, and in that event the sole responsibility of the company or companies shall be to refund to me, through regular channels, the price paid by me for said ticket; (2) that if I am accepted as a passenger, I voluntarily assume the ordinary risks of air transportation and stipulate that the company or companies represented herein shall not be responsible save for its or their own neglect of duty; (3) that after the commencement of the flight, I may be landed and discharged in such manner and in such place or places as the pilot, in his sole discretion, shall see fit, and in that event the only responsibility of the company or companies named herein shall be to refund to me such proportion of the price paid by me for this ticket as the distance between the place of landing and the place of destination bears to the whole length of the flight for which this ticket has been issued.

TWO: (4) That this ticket is non-transferable and if presented for passage by any person other than myself may be taken up and cancelled without refund. (5) The presentation of this ticket and the use of it by any person other than myself shall be considered a fraud and trespass upon the company or companies.

THREE: (6) I further agree that the company or companies represented herein shall not be liable for any loss or claim arising out of delay or failure, for any reason, with or without advance notice, of aircraft to depart from any point or arrive at any point according to any schedule, agreement, statement or otherwise, nor for any loss or damage or injury to any person or property, arising out of such condition or otherwise, except negligence upon the part of the company or companies represented herein.

FOUR: (7) The air transport company is not responsible beyond its own lines and in selling this ticket and checking baggage thereon for transportation beyond its own lines, this company acts as agent for the other transportation agency or agencies. (8) The liability of the air company for loss or damage to baggage and/or personal property is limited to the amount of $100.00, unless a higher valuation be declared and an additional charge paid therefor.

Three colors have been recommended for the three types of tickets. A green tinted form is for one way passage, a grav form for round trip passage and a light red form for inter-line passage Following comments by the operators a final report will be issued.

Begin Manufacture Of New Scott Beacon

LOS ANGELES (CALIF.)—A new beacon which combines four separate light beams emanating from a single light source has been placed on the market by the Aeronautical Products Corp., Los Angeles. This light is the invention of A. B. Scott, Hollywood experimental engineer who has spent many years developing a beacon for airway use. The present type was installed at Cleveland at the time of the National Air Races and a duplicate is now in operation on the roof of the Cleveland City Auditorium. Others are in operation on the control tower of the Grand Central Air Terminal, and on the roof of the Sunset Fields Country Club, Los Angeles, the latter for experimental and demonstration purposes.

The Scott beacon is built of aluminum in the form of a closed cylinder 54 in. in diameter and approximately 58 in.

Scott Beacon with one window open

high. This cylinder is mounted upon a standard revolving base rotating at 6 r.p.m. In the center of the cylinder is a light source which remains stationary, the lamp being from 1 to 5 kw. power as conditions may require. There are four openings in the cylinder, one in the domed roof serving to project a ceiling beam upward vertically, and three openings spaced equidistantly around the circumference of the cylinder to project three horizontal beams. The ceiling opening is 30 in. in diameter and contains a plain plate glass lens of white glass dome-shaped in order to provide for water runoff. Each of the wall windows is approximately 12 in. wide and 26 in. high, the glass being flat plate of alternate red, green, and white coloring. The cylindrical housing is water tight and contains no vents, the large interior volume of the housing and the aluminum walls providing ample cooling for the single lamp. Each of the three windows may be opened, however, for changing mirrors or lamps.

The four beams from this beacon are projected from four separate mirrors of chromium plated copper, each 30 in. in diameter. The mirror for the ceiling light being located on the bottom of the case with the lamp standard projecting through the center, while the three horizontal beams are projected from mirrors placed within the case at points opposite each window, and approximately 22 in. from the lamp. Thus all four beams cross each other at approximately the light source, or lamp. Revolving at 6 r.p.m. this light generates eighteen separate flashes of alternate white, green, and red. Because of the wide vertical opening in each of the wall windows the horizontal beams have a vertical spread of about 15 deg., making the light effective at any altitude above the horizon.

Green course lights are used in connection with the beacon, pointing each way along the air route. These lights are controlled by a contact so that they flash on as one beam passes and off as the next beam arrives at the course, thus providing constant course lights during periods between flashes. This beacon is based upon the principle of the visibility of a diffused, or glow light, rather than a concentrated beam, and visibility tests have indicated that the light so projected may, in hazy weather, be visible at greater distance than a concentrated beam of higher candlepower.

Bridgeport-Albany Line Opened

BRIDGEPORT (CONN.)—New England & Western Air Transportation Co. has started service on a Bridgeport-Hartford-Springfield-Albany route. The fares are as follows: Bridgeport to Albany, $8.20; Bridgeport to Hartford, $3.60; Bridgeport to Springfield, $5.60; Hartford to Springfield, $2.50.

Make Amendments To Aviation Radio Plan

WASHINGTON (D. C.)—The Federal Radio Commission on Feb. 7 adopted amendments to the aviation Radio Plan which it set up Sept. 9. [See AVIATION for Sept. 28.] The amendments are as follows:

1. By changing the frequencies 3136 kc., 3142 kc., and 3148 kc. set out in paragraph numbered (1) of said plan to the frequencies 3160 kc., 3166 kc., and 3172 kc.

2. By changing one of the frequencies designated in said plan for the use of the "Red" chain from 3142 kc. to 3172 kc.

Upon motion duly made and carried, the Commission in order to bring General Order No. 74 into conformity with the North American Agreement amended said order as follows:

1. By changing the frequencies 3136 kc., 3142 kc., and 3148 kc. designated in said General Order for aircraft and aeronautical stations to 3160 kc., 3166 kc., and 3172 kc.

2. By adding to and including in the list of frequencies designated in said General Order for the use of "ship stations and/or coastal stations" the frequencies 3136 kc., 3142 kc., and 3148 kc.

Henrickson Ice Warner Announced

WASHINGTON (D. C.)—An instrument designed to warn pilots of the existence of conditions conducive to the formation of ice has been developed by the Bureau of Standards and is known as the Henrickson Ice Warner. It consists of a thermal switch located on a strut or other exposed part of the plane in the free air stream, and an indicator installed in the cockpit. A red light in the indicator flashes on at temperatures between 26° and 32° which, according to experiments of the National Advisory Committee for Aeronautics, are those temperatures at which ice is formed in saturated atmospheres. Whether the degree of saturation present in the air is sufficient to prove dangerous is still a matter for the pilot's judgment. Both the lift of the plane and the gross weight are greatly affected by ice formation, which may occur very rapidly between these two temperatures.

Standard pocket size flashlight batteries are used for ease of installation, and are placed in a small box containing a red lamp within the cockpit. Contact points are made of coin silver. The lower contact is attached to an insulating sheeting of bakelite, and is crescent shaped so the temperature-actuated switch arm can ride over it without jamming due to any increase or decrease in temperature.

The time lag of the instrument is not excessive, although somewhat greater than that of the minimum temperature recorder. A thin aluminum base, to which the bimetal coil is attached, has proved itself a good radiator. In flight tests made by Roger Scott, operations manager at Hoover Field, Washington, the instrument has functioned satisfactorily. Previous laboratory tests made on a standard vibration board, and in an automobile over rough roads in an atmosphere of 32° have shown that the bimetal coil with attached switch-arm is sufficiently stiff to operate even when subject to severe vibrations.

E.A.T. Moves to Atlanta, Ga.

ATLANTA (GA.)—The new $65,000 Eastern Air Transport hangar at Candler Field has been completed, and transfer of operations headquarters from Richmond, Va., is well under way. Personnel transferred or to be transferred includes C. H. Dolan, assistant manager of operations; W. E. McDaniell; John Ray, chief of engine overhaul; T. M. Tepleman, manager of instrument department; L. G. Sheldon, manager of parts department.

Brower Line Touches Lincoln

LINCOLN (NEB.)—Passenger service between Omaha and Wichita by Brower has been extended to include this city. The company operates two Curtiss Robins daily and makes stops at Salina and Belleville, Kan.

AIRPORT CONSTRUCTION PROJECTS

Central

THE FIRST HANGAR HAS been completed at the Curtiss-Steinberg Airport, East St. Louis, Ill. The second and third hangars will be completed on or about March 15 and April 15, respectively. Water and sanitary sewer systems are complete and pumps are being installed in the main drainage pumping station. Immediate resumption of work on the concrete runways depends upon temperate weather. The first three 1,600 ft. runways are about one-third complete.

The runway extending along the hangar line is nearly finished. Considerable concrete has been laid on another runway extending at right angles to the first across the field and excavation has been completed for the third, which bisects the arc between the two. Within three months it is expected that complete lighting will have been installed. It was announced recently that flying activities of the Curtiss-Wright Flying Service would be inaugurated at the airport by Feb. 24. When completed, the airport will represent an investment of about $3,000,000.

Construction work for a building to house apparatus for the new Kansas City radio range beacon has been started. The installation is to be about ½ mi. north of airway radio communication station KRC. The new station will cast three beams along divisions of three airways now in operation, while the fourth beam will be directed southeast of Kansas City. A similar radio beacon is to be established at Columbia, Mo., which will cast its beams toward Kansas City and St. Louis on the St. Louis-Omaha airway.

It is suggested by Maj. Albert Bond Lambert that four runways instead of eight would be sufficient to meet the needs of air traffic at the Lambert-St. Louis Airport. This proposal, which would eliminate the parallel runway system proposed by B. Russell Shaw, Inc., is the result of a study of that company's plan by a committee of the Air Board of the St. Louis Chamber of Commerce.

A special jack which is part of the oleo gear has been developed by Boeing Airplane Co. to facilitate changing tires on the Boeing tri-engined transport plane.

East

Colonial Airways dedicated its new $110,000 hangar at the Newark Municipal Airport on Feb. 17. The building was erected by the City of Newark and leased to Colonial. It contains a passenger waiting room, company offices, lounge, sleeping accommodations for pilots, and hangar space. It was in this hangar that the sprinkler system tests were made late last fall.

A $50,000 bond issue recently authorized to complete a $250,000 improvement program of the Atlantic City (N. J.) Airport has been rescinded for reasons of economy, it has been reported.

Mayor Curley of Boston, Mass., is planning to spend $250,000 for filling in flats surrounding the present Municipal Airport and another $100,000 for building a concrete seaplane ramp, if the state of Massachusetts will lease to the city additional area.

The capital of Franklin Airport, Inc., at Turners Falls, Mass., has been increased to $100,000 for the sake of improving further the airport project in that city. About 10,000 shares of $10 each have been issued. C. F. Mosher is president.

A total of $256,400 in stock for the Harrisburg (Pa.) airport has been sold. The seven-day campaign among the citizens of the city by solicitors representing the Harrisburg Chamber of Commerce secured $6,400 more than the quota.

A contract for $10,000 for dredging at the Naval Reserve Aviation Base, Squantum, Mass., has been awarded to the Trimount Dredging Co., 10 State St., Boston, Mass.

West

The first 8,000-ft. unit of irrigation pipe is being installed at the new United Airport, Burbank, Calif. More than 3 mi. of pipe is being laid preparatory to the planting of the entire port, except the surfaced runways, to alfalfa. The new terminal building is nearing completion and dedication of the field is expected to officially take place during March. Pacific Air Transport is already using United Airport as a southern base for operations, and test flying is being done from the field by the Lockheed Aircraft Co., and Menasco Motor Corp. The Northrop Aircraft Corp. factory and the Hamilton-Standard Pacific Coast factory branch also are located on the port.

Fourteen tons of steel for airport buildings have arrived at Lind, Wash. This is for airport work at Cheney, Sprague Lake, Lind, and Connell, Wash.

South

The East Baton Rouge (La.) parish police jury took title Feb. 14 to more than 200 acres of land on Goodwood Plantation, near Baton Rouge, to be used for the development of an airport, for which the parish has voted more than $150,000. The price was $50,000. Plans for the airport are being completed by Jones, Roessle and Olschner, architects of Baton Rouge, for a hangar and administration building to cost about $50,000. The hangar is to be of steel and brick, 128x140 ft. and the administration building is to be two stories in height, built of brick and 45x108 ft. First contracts have been awarded and grading and drainage work is to be started immediately.

The Florida Airport Corp. has started grading two runways on the new Dunedin (Fla.) Airport. One runway will be 1,200 ft. long while the other will measure 900 ft.

A modern airfield is to be developed at Fort Pierce (Fla.) as a result of the purchase of a 167-acre tract of land from the city by Capt. F. M. Upton.

Brown Defends Bill

(*Continued from page 460*)

cents) per mile flown was apportioned as follows: communications (radio, teletype, etc.) 1.2 against 2.3; insurance, 3. against 6.; traffic solicitation, 9.1 against 5.; administrative overhead, 12. against 7.; maintenance, 9.25 against 9.14; operation of planes, 22. against 35.67; depreciation, 19. against 15.19—a total of 77.9 cents for 1926 and 81.4 for 1929.

That air mail lines will be forced into the mail and passenger business was forecast by Colonel Henderson, who also contended that it would place the aviation industry upon the desk of the Postmaster General. Colonel Henderson strongly favored the measure, as stabilizing the industry.

Transport Men Attend

Others who testified in support of the bill were W. Irving Glover, Assistant Postmaster General, William P. MacCracken, Jr., who said the revenues of Western Air Express, under the new bill, would be more than $1,500,000 less than at present; Mrs. Mabel Walker Willebrandt, R. J. Smith and Col. T. H. Bane, vice-president, of The Aviation Corp.; P. G. Johnson of Boeing, Capt. Archibald of Pickwick; and Lawrence King of Detroit Aircraft. Present but not testifying were Clifford Ball, Lester Seymour of N.A.T., Harris Hanshue and James G. Wooley of W.A.E., L. H. Mueller of Varney; Hainor Hinshaw of The Aviation Corp., and Chase Gove and Earl Wadsworth of the Post Office Department.

No executive session has been called as we go to press, but it is considered probable the bill will have been reported out Wednesday, Feb. 26. Proponents of the bill are in hopes that the new Aeronautics Branch regulations will have been announced by that time. Assistant Secretary of Commerce Young is understood to have taken the regulations to the St. Louis show for informal consideration by the industry.

Offer Foamite Airport Truck

ELMIRA (N. Y.)—"Wideway" is the name of a new portable Foamite truck recently developed for airport use by American La France & Foamite Corp. It consists of a 40-gal. solution tank mounted on a carriage specially constructed to be drawn over rough, frozen or soft ground, having 8-in. tread tires on the wheels. The 40-gal. tank is capable of producing 300 gal. of Fire-foam solution, and the stream is said to have an effective range of 50-60 ft.

S. A. T. Issues Airport Booklet

FORT WORTH (TEX.) — Several plates illustrating plans for hangars, administration buildings and field layout are included in a booklet on airport engineering and construction recently issued by Airports Engineering & Construction Corp., subsidiary of Southern Air Transport division of The Aviation Corp.

Pennsylvania Issues Licenses to Airports

HARRISBURG (PA.) — Twenty-three licenses to airports and landing fields had been issued up to Feb. 1, the Pennsylvania Department of Internal Affairs announced today. The licenses are issued under the state Aeronautics Act which requires such fields to have a license issued by the Aeronautics Commission. Commercial licenses have been issued to the following:

Patco Airport, Patco Flying Service, Norristown; Allentown Airport, Allentown Aviation Corp., Allentown; Pittsburgh-Butler Airport, Pittsburgh Aviation Industries, Butler; Lancaster Airport, Lancaster Airways, Inc., Lancaster; Pitcairn Airport, Pitcairn Aviation, Inc., Hallowell; Williamsport Airport, Williamsport Airport Co., Williamsport; Gettysburg Airport, Gettysburg Flying Service, Gettysburg; Philadelphia Airport, Ludington-Philadelphia Flying Service, Philadelphia; William Penn Airport, Interstate Flying Service, Philadelphia.

Limited commercial licenses were issued to the following:

Sky Haven Airport, John D. Jacobs, Goshenville; Beaufort Airport, Harrisburg Flying Service, Harrisburg; Pittsburgh-Greensburg Airport, Main Aeronautics Company, Greensburg; Stultz Field, Altoona Aircraft Corp., Tyrone-Altoona; Yost Airport, Lloyd O. Yost, Conyngham; Somerset Airport, Duppstadt Airport Company, Somerset; Mayers Airport, Mayer Aircraft Corp., Bridgeville; Richmond Airport, W. T. Richmond, Meadville; Moscow Airport, B. J. Biesecker, Daleville; Madeira Flying Field, J. H. and Samuel P. Madeira, Reading; Susquehanna Airport, J. P. Walmer, Lemoyne; Bowers Airport, Frank J. Bowers, Greenville.

Private license was issued to Keystone Aircraft Corp. landing field, Keystone Aircraft Corp., Bristol.

Test Automatic Pilot On Cross-Country Trip

CLEVELAND (OHIO)—The first cross-country flight with the automatic pilot equipped plane of the Guardian Air Corp., of Elyria, Ohio, ended successfully at Chicago after a 319-mi. trip from Cleveland. H. P. Little, National Air Transport mail pilot, flew the plane to Toledo. Walter Addems, another N.A.T. flyer, took it on from there. Otto W. Greene, inventor of the device, was a passenger.

Little reported that the control operated very efficiently and that it flew the plane continuously after the take-off except when he took control to relieve the monotony of having nothing to do. Crossing Sandusky Bay, Little said, he let the control fly the ship 25 ft. above the ice to see if it would hold the plane level, which it did. Bumps in the medium rough air encountered were smoothed out or eliminated entirely by the Guardian Air control, he declared.

Earlier in the week Capt. A. H. Page, Marine Corps, and Lieut. H. C. Rodd, Navy pilot, tested the device here. Captain Page, who has been experimenting with blind flying for the Marine Corps, expressed gratification with the performance of the control and said that he would want one installed on his blind flying laboratory fighting plane.

Government Approves Air Fares

WASHINGTON (D. C.) — The General Accounting office in a recent ruling has decided that Federal employees may make official trips via the airlines in cases where the air transport rates are no higher than the railroad fare plus the Pullman charge. It was ruled at the same time that air transportation at higher rates will be approved when emergencies in the public service may require particular speed.

Issue Blue Book On N. Y. State Aviation

NEW YORK (N. Y.)—The New York State Commission on Aviation has issued its annual report and the second of its so-called Blue Books describing aviation throughout the state. The Blue Book contains maps showing the location of airports in the state, the location of beacons and intermediate fields along the Newark-Albany and the Albany-Cleveland airways, and the location of the high power transmission lines.

The report states the commission's disbelief in the efficacy of a state aviation department at the present time, and recommends, among other items, the following: Licensing of all flying schools by the state department of education; consideration of legislation prohibiting operation of any plane in the state not having a federal license; enactment of legislation relieving the owner, proprietor or operator of an air field and aircraft from liability for damage due to accidents not caused by his negligence, and enactment of federal air rules and regulations into the statutes of the State of New York.

Maritime Mail Line Revised

OTTAWA (CANADA)—The Montreal-Quebec-St. John-Moncton (N. B.) air mail service inaugurated Dec. 9 by Canadian Airways, Ltd., of Montreal, has been slightly revised to provide greater operating efficiency. Starting Jan. 27 two services were made out of the previous single line. One service connects Montreal and Quebec daily except Saturday while the other will serve Montreal, St. John and Moncton without a call at Quebec. This is operated daily except Saturday and Sunday and involves flying across the heavily wooded northern part of Maine where a series of reporting stations are being established as a precaution against delay in giving aid in case of difficulties.

Vote Detroit-Wayne Port Work

DETROIT (MICH.) — An expenditure of $414,050 for improvement work on the Detroit-Wayne Industrial Airport on which the Stinson Aircraft plant is located has been authorized by the owners. The work embraces completion of clearing and grading and the building of several hangars.

New Jenkins Radio Antenna Demonstrated

WASHINGTON (D. C.)—Performance tests on the aft-flying radio antenna invented by C. Francis Jenkins are reported to have proved its practicability for two-way telephonic communication over a distance of 250 mi. The maximum distance is believed not to have been reached as yet. A four-place Stinson Junior powered with a Whirlwind 225 hp. engine, and a Ford transport have been used for the tests.

Army and Navy officials are now experimenting with the outfit, which weighs about 55 lb., including radio code apparatus and phone set, and is said to be less expensive to produce than other sets. Portable batteries are substituted for the generator, a change which enables communication to be conducted from the plane when grounded, it is reported.

Shielding Called Unnecessary

The most important claims made for the new antenna position are that it eliminates the necessity of sheathing the engine to prevent interference from the ignition system, and that aerials of varying length may be used, as is best suited to the wave length employed. According to Mr. Jenkins an aft antenna is in the electric shadow of the metal firewall separating the pilot's cockpit of closed planes from the cabin proper, and may thus be used in planes powered with unshielded engines. The antenna is held in position by a small wind sock attached to its end. One man can operate the whole outfit, it has been stated, as the reel-out and reel-in of the antenna is automatically controlled.

Other advantages claimed are: practicability of employing long aerials, giving large signal pick-up with correspondingly large initial signal in the receiver; less air resistance than the trailing wire or aerial mast; one-third reduction in weight over present sets, and reduced cost; a gain of 25,000 producing more satisfactory signals than a million gain with a six-foot mast; increased reliability and decreased fading resulting from the long antenna. Operations from tri-engined planes have shown, according to Mr. Jenkins, that the normal sheathing around the outboard engines effectually cuts off any interference from the engines.

Small Wind Sock Is Sufficient

The antenna is wound on a reel which is attached to the inside of the cabin wall. The antenna passes up and over a pulley through the top of the fusilage and back through a short tube attached to the navigation light on top of the rudder. When the antenna is wound up the wind sock is in position behind the short tube attached to the rudder. Whatever resistance to the wind this wind sock offers in its at rest position may be discounted as such periods are comparatively slight. The sock is only about twice as long as one's hand.

Tampa Establishes Plane Storage Rates

TAMPA (FLA.)—Effective February 22, the following storage charges have been established at Tampa Municipal Airport:

Rate for planes in hangar and receiving daily service:

Wing Spread	Per Day	Per Month
Less than 750 sq.ft.	$3	$30
750-1,000	3	35
1,000-1,500	4.50	45
1,500-2,000	6	60
2,500 and over	6.50	65

Planes in the hangar receiving daily service and in the airport ten days or more but less than 30 days will be charged 50 per cent of the daily rate. Planes in the hangar not receiving daily service, that is, dead storage, will be charged 50 per cent of the latter rate.

Continuous users of the airport may contract for storage with a 5 per cent discount for 3 mo. minimum, 10 per cent for 6 mo. and 15 per cent for 12 mo. Planes using the airport but not housed in the hangar will receive dead storage rates.

All school operators shall pay 35 per cent of their gross receipts. Operators carrying passengers for hire except regular passenger lines operating on regular schedules between Tampa and outside points shall pay 10 per cent of gross receipts.

Map Shows Air Routes to City

NEW YORK (N. Y.)—Borrowing an idea from the automobile world, the Curtiss-Wright Airports Corp. has devised a map showing the air approaches to the St. Louis district. This map covers an area of 60 mi. on one side of the city and 50 mi. on the other and shows location of the various airports, beacons, distinguishing landmarks, lighted airways, transmission lines, railroads, highways, golf links, parks, rivers, cities and towns, etc. The map is printed on a 15-in. square sheet and the terrain shown includes about 300 sq.mi. This is similar to an automobile map showing the various approaches to a thickly settled community.

Airway Marking Group Elects

ST. LOUIS (MO.)—Officers of the National Airway Marking Association were elected during the International Exposition here. They are as follows: President, William B. Stout; Vice-Presidents, James A. Doolittle, W. M. Rogers, Charles A. Lawrence and Maj. William Robertson; Secretary-Treasurer, Frank A. Davis, and General Manager, Woody Hockaday. Formal acceptances by Stout and Robertson had not been received as AVIATION goes to press. The association has scheduled a meeting in Washington some time this summer at which time plans for marking highways will be discussed.

Continental Air Express Changes

LOS ANGELES (CALIF.)—Reorganization of Continental Air Express, operating tri-engined passenger transport planes between Los Angeles and San Francisco, has brought additional capital into the company to facilitate further development.

Airway Briefs

Tennessee's Sky Harbor, between Nashville and Murfreesboro, has been offered to the city of Nashville for a municipal airport for $265,000 by Interstate Airlines.

A city airport commission of five members, serving without pay but each under $5,000 bond, has been established to manage and supervise the Council Bluffs (Ia.) municipal airport.

Porterfield Aviation Interests, Inc., Kansas City, Mo., has purchased an airport from Pittsburg Airport Co. at Pittsburg, Kan., and will erect a five-plane hangar.

Part of the municipal hangar at Port Columbus has been leased to Golden Eagle Aviation Co., and efforts will be made to lease the remainder to private interests for the rest of the year, since the city is without funds to operate it.

The name of the Duluth (Minn.) municipal airport has been changed from Harvey Williamson to Williamson-Johnson airport. Requests are being made for establishment of an air mail route from Duluth to Chicago.

Air mail routes between Winnipeg, Regina, Moose Jaw, Medicine Hat and Calgary; and between Edmonton, North Battleford and Saskatoon, will be put in operation March 3, according to official announcement by the Canadian Postmaster General.

Funds for a municipal airport at Moline, Ill., have been held up because of an error in wording the tax proposition on a recent ballot intended to provide $50,000 for this purpose.

Ten new tri-engined transport planes will be placed in operation between Chicago and San Francisco about May 1 by Boeing Air Transport Co. They are expected to operate on a 20-hr. schedule.

Elgin and Rockford, Ill.; Janesville, Wis.; and Rochester, Minn., are to be linked with the Chicago-Minneapolis air mail service, effective March 8.

Arrowhead International Airways, a subsidiary of Schlee-Brock Aircraft Corp., will open an airline sometime in the spring between Duluth, Minn., and Port Arthur, Fort Williams and Isle Royal, using Lockheed Vega planes on floats. A line between Duluth and Minneapolis is also planned by this company.

Oakland (Calif.) Airport Commission is considering installation of a Palmer balloon beacon, intended to provide airway marking above clouds and fog.

Kohler Aviation Corp. has reduced air express rates between Milwaukee, Wis., and Muskegon and Grand Rapids, Mich., to the level of railroad express rates.

City Airport committee of Madison, Wis., has tentatively agreed to lease the airport owned by Royal Airways Corp. for $200 per month, to be operated as a municipal field.

Standard Airlines, Inc., has been authorized by the Federal Radio Commission to operate a 250-watt radio station at Sweetwater, Tex.

Colonial Air Transport has moved its traffic department to its hangar at Boston Municipal Airport.

Thompson Aeronautical Corp. has ordered several new Keystone-Loening amphibions for use between Detroit and Cleveland. More than 3,000 passengers were carried over this route last year in six months of operation.

Passengers arriving at or departing from Swan Island airport, Portland, Ore., numbered 116 during January. 14,145 lb. of mail was handled, and 75 students were enrolled in aviation schools, despite bad weather during much of the month.

One Ford plane (three Wright engines) in the service of Continental Air Express between Los Angeles, Coalingo, Fresno and San Francisco, Calif., was flown 74,000 mi. in three and one-half months recently completed.

Sky-View Flying Service, chartered under Michigan laws, has filed a certificate to allow it to do business in New York State, with $500,000 capital.

Stout D & C Air Line will use two new 20-passenger Dornier Super-Wal flying boats between Detroit, Cleveland and Buffalo as soon as the lakes are open to navigation.

Mobile, Ala., plans to hold a municipal referendum on the question of a $50,000 bond issue for improvements at Bates Field.

A new snow plow, for use in clearing runways, has been delivered at Port Columbus.

Northwest Airways, Inc., recently moved its general offices from Wold Chamberlain field to the St. Paul (Minn.) municipal airport, but retains a hangar at the holder field.

A new record of 1 hr. 34 min., 203 m.p.h., between Chicago and Cleveland, was set recently by Robert T. Hopkins, N.A.T. pilot, in a Curtiss Falcon with Conqueror engine.

N.A.T. officials are considering adopting fixed wire radio antennae for winter use, as several radio masts have been broken off by ice formation.

The Post Office Department has announced that last-minute mail received uncancelled at an air mail field may be accepted by the pilot, a practice similar to that permitted in the railway mail service.

T.A.T.-Maddux Air Lines is arranging co-ordinated service with Southern Pacific Railroad in California and northern Mexico.

Pan American Airways reports that passenger traffic on the Havana, Nassau, and West Indies divisions of the line is nearly double that of a year ago.

Boeing Air Transport Co. has leased land for the erection of a radio telephone station at the emergency landing field near Sydney, Neb.

FOREIGN ACTIVITIES

Mexican Firm Plans To Extend Its Service

MEXICO CITY (MEXICO)—Extension in the near future of the air line now operated between San Luis Potosi City and Torreon from the latter town northeast to Piedras Negras, Eagle Pass and San Antonio, is contemplated by Corporacion Aeronautica de Transportes, according to the president, Eduardo Meade. Plans are to operate planes only as far south as San Luis Potosi and to transfer passengers there to trains for the journey to Mexico City. The reason for not flying all the way into the national capital, it is explained, is that many air travelers find it uncomfortable to make the trip in planes because of the necessity to ascend to from 12,000 to 15,000 ft. to clear mountains.

The proposed schedule for the Mexico City-San Antonio service is to make the trip from San Antonio to San Luis Potosi City in about 4 hr., place the passengers aboard a connecting train which will enable them to travel from the Texas city to the Mexican capital in 9 hr. The same speedy schedule would prevail for the north-bound trip. The one way plane-train fare has been estimated at $180.

Italy Starts Civilian Training Squadrons

ROME (ITALY)—Largely with a view to training reserve military pilots, a number of Air Touring Squadrons are being formed throughout Italy. Members will be expected to put in 10 hr. of flying annually, and must fly solo after 4 hr. of instruction. The annual training period will be of a maximum of 40 days, and the maximum flying time will be 20 hr. Members who complete the minimum requirements will receive 1,000 lire (about $50) per year.

From four to sixteen planes will be assigned to each of the following bases: Milan, Turin, Rome, Ferrara, Venice, Leghorn, Ancona, Portorose, Loreto, Padua, Brescia, Verona, Naples, Pisa, Genoa, Palermo, Bari. Most of them will be Fiat A.S.1, and Breda 15, many of the latter equipped as seaplanes. Provision is also made for paying part of the expenses of members owning their own planes.

Farman Reports 1929 Operations

PARIS (FRANCE) — Farman Airlines show for 1929 the following figures: distance flown, 704,000 mi.; passengers carried, 8,880; freight, 946,500 lb.; mail, 28,800 lb. An average of one forced landing for 100,000 mi. was recorded and one trip interrupted on account of weather for 50,000 mi.

Announce Swedish Show Sept. 6-8

STOCKHOLM (SWEDEN)—An international aero exhibition will be held here Sept. 6-8, under the patronage of the Crown Prince of Sweden, organized by the Royal Swedish Institute for Scientific Industrial Research, and the Swedish Royal Aero Club. It will be designated officially by the initials, I.L.I.S. Application for stand space must be made by May 15. The show will be held in hangars and special tent hangars at the Stockholm Airport and seaplane base. There will also be flying competitions. The secretary of the exhibition may be addressed at Kungsgatan, 33, Stockholm.

Caquot Outlines French Technical Developments

PARIS (FRANCE)—At a dinner offered in his honor Jan. 23, M. Caquot, general director of the technical department of the French Air Ministry, made a number of important predictions as to the lines which will be followed in the technical development of French aircraft. Perhaps the most important point was his statement that all-metal construction would become nearly universal as rapidly as possible, and that development of light alloys, as well as high tensile steel, and appropriate machines for their use, was to be greatly encouraged.

So far as engines are concerned, cooling systems, superchargers, and heavy oil engines are to receive the most attention. Wind tunnels now in use are to be improved, and a large test basin for hulls and floats is to be built. Of special interest is his announcement that the status and remuneration of personnel in the technical department is to be improved, to meet competition from private firms.

British Extend Aviation Insurance

LONDON (ENGLAND) — Leading British accident offices are extending their personal accident policies so that 10 per cent of the benefits ordinarily payable in the case of accident is available in the event of an accident to the insured while travelling by air. The provision is not confined to specific flights. In the event of a fatal accident the family of the victim receives a lump sum, while in the case of temporary or total disablement the insured himself receives either a lump sum or a weekly payment. Anyone contemplating a journey by air may secure coverage up to $50,000 under a personal accident policy. Insurance offices are willing to consider any special flying risks. Individual risks are dealt with according to their particular merits.

English Airline Progress Reviewed

LONDON (ENGLAND)—The possibility of the airline to India being extended to Australia and also from Egypt to South Africa this year has been announced by Lord Thomson, Secretary of State for Air. Lord Thomson said that the air routes of the British Empire in 1928 amounted to 11,000 mi. and in 1929 to 19,000 mi. The reasonable expectation for 1930 is an extension to 35,000 mi., an increase of 70 per cent. The 1929 mileage is:—Canada, 6,500 mi.; Australia, 5,500 mi.; South Africa, 1,500 mi.; India, 715 mi.; and Great Britain, 5,000 mi.

To Imperial Airways has been allotted the task of developing the great trunk lines linking the United Kingdom with India, via Egypt, and then on to Australia, and through Africa to the Cape. When these two extensions are working the Empire will have 35,000 mi. of airways. Lord Thomson said he was waiting very hopefully for an announcement from Australia in regard to a certain vital section of one of those great routes, and he expressed his appreciation of the action of the South African government in regard to the route across Africa. The surveys on both those routes were far advanced.

"The airship program," Lord Thomson continued, "has been well worth the money spent on it, and the two new airships have given enough satisfaction to justify reasonable optimism about this form of transportation. I feel that we are justified in continuing this experiment; it is essentially the vehicle for ocean flying. Air development, unlike the development of the mercantile marine, has grown in the hothouse of war, which forced it artifically, and it has got to be maintained artifically at present unless the British people are prepared to drop out of the march of human progress."

German-Turkish Agreement

BERLIN (GERMANY)—Details of the 20-yr. contract between Luft Hansa and the Turkish government for exclusive operation of a Berlin-Angora mail and passenger line have been obtained by U. S. Department of Commerce representative. In return for the concession, Luft Hansa agrees to construct a hangar and reception building at Istanbul, and to employ Turkish mechanics. The route may be extended to the far east on condition that all German mail be carried to Turkey over the present projected line. Junkers F 13 four-passenger and mail planes, using 280-310 hp. water-cooled engines, will be put in service on the line this spring.

Monument Marks Famous 1908 Flight

PARIS (FRANCE) — On Jan. 13, a memorial [See AVIATION for Feb. 1, for photograph] was inaugurated at Issy-les-Moulineaux, in the outskirts of Paris, to perpetuate the remembrance of the first kilometer in closed-circuit ever flown in history, by M. Henry Farman, on a Voisin biplane with 35 hp. Antoinette engine, exactly twenty-two years ago. M. Laurent Eynace, the Air Minister, presided at the unveiling of the monument. Numerous personalities attended, including M. H. Farman, G. Voisin and A. Santos-Dumont. On the memorial are engraved a plan of the flight, the figures of the responsibles, a a sketch of the machine, and an inscription which may be translated as follows:

"On this field, under control of the Aero-Club de France, on Jan. 13, 1908, for the first time in history, one kilometer in closed-circuit was flown by Henry Farman, on a biplane designed and built by the brothers Gabriel and Charles Voisin, with Antoinette engine created by Levasseur, thus winning the aviation grand prize "Deutsch-Archdeacon" and setting aviation world's records to: Distance, 1,000 m.; duration, 1 min., 28 secs."

Air Union Traffic Reported

PARIS (FRANCE)—The Compagnie Air Union, which operates between Paris-London, Paris - Lyon - Marseille, Lyon-Geneva, Marseille-Ajaccio-Tunis, shows the following traffic figures for 1929: Distance flown: 1,132,000 mi. as compared with 840,000 mi. during 1928; passengers carried: 17,069 as compared with 11,889 during 1928; freight carried: 2,098,000 lb. as compared with 945,000 lb. during 1928. On the Paris-London route 1,078,000 lb. were carried in the outward direction and 772,000 lb. in the reverse direction.

Italian Transport Reported

ROME (ITALY)—Further statistics on air transport in this country have become available. (See AVIATION for Jan. 25, page 182). The figures are as follows:

	1926 (Apr. 1-Dec. 31)	1927	1928	1929 (First Half)
Mi. of route...	2,387	2,896	5,368	7,946
Mi. flown.....	324,859	824,474	1,236,913	799,506
Passengers carried.....	3,991	9,757	15,629	10,141
Mail and newspapers (lb.).	3,466	14,769	46,945	35,730
Baggage (lb.)..	90,186	225,601	369,356	289,030
Packages (lb.).	.....	82,646	133,396	131,512

Mexican Line Reports

MEXICO CITY (MEXICO) — During 1929, planes operated by Corporacion Aeronautica de Transportes were flown 5,763 hr., covering over 500,000 mi., carrying 982 passengers and about 4,500 lb. of mail.

Foreign Briefs

Marcel Doret in a Dewoitine 27 monoplane, with 600 hp. Hispano-Suiza engine, won a recent pursuit plane race over the circuit Brussels-Liege-Brussels, organized by the Belgian government. Another Frenchman was second, a Britsh pilot third, and a Belgian fourth. M. Doret also broke the Paris-Brussels record by covering the distance in 51 min., at an average speed of 201 m.p.h.

Commercial flying in Denmark, handled entirely by Danish Aviation Co., showed little change in volume from 1928 to 1929, according to report by U. S. Department of Commerce representative.

An aeronautical museum is to be opened at Tempelhof airport, Berlin, Germany.

Fixed neon and gas lights on the Berlin-Koenigsberg route are to be replaced by revolving 500-watt beacons.

The government of Brazil is planning construction of an airport and seaplane base on one of the islands in the harbor of Rio de Janeiro.

The new large Caproni 90 is being prepared for attempts on several world's records. The Caproni 100 T light plane received the Grand Prix for its category at the Barcelona Aircraft Exposition.

A propellerless ornithopter is said to have been successfully demonstrated at Riga, Latvia, by the inventor, Captain Sarin, who won the Clifford Harmon aviation trophy in 1929.

Airlines from Shanghai to Chengtu, from Nanking to Harbin, and from Shanghai to Yunnan are projected by the Chinese nationalist government's Ministry of Communications.

A large airport is being constructed near Tokio, and is scheduled to be ready for operation next August. Equipment will include radio facilities and a meteorological station.

Japan Aerial Transportation Co. has purchased a Dornier Wal flying boat and two Fokker Super-Universal planes for use on its Fukuoka-Shanghai line. Regular service between Fukuoka and Osaka, operating thrice weekly, was scheduled for inauguration Feb. 15.

It has been reported that on Dec. 31, 1929, there were 214 planes owned by 196 private owners in England.

Compania Aeronautica de Transportes carried 1,041 passengers in about 100,000 mi. of flying in Mexico during January.

An international tourist and communications exhibition will be held in Poznan, Poland, July 6-Aug. 10.

During December more than 2,500 people were taken on aerial sight-seeing trips over Perth, Australia.

La Compania Aereo Postal Chileana has been formed at Sanitago, Chile, to transport passengers and mail.

The Jaguar Major, a geared fourteen-cylinder radial engine, rated 560 hp. at sea level with geared fan, and 500 hp. at 11,500 ft. with supercharger, having an overall diameter of 46.75 in. and weighing 1.75 lb. and 1.90 lb. per hp., respectively, for the two models, has been introduced by Armstrong-Siddeley Co. in England.

Authorization has been given by the government of Brazil for a visit of the Graf Zeppelin, to take place in April or May, and experimental communication has been established between Brazilian National Telegraph radio station and the station at Hamburg, Germany, to be used for weather reporting.

Airports at Zacatecas, Agua Caliente, and Torreon, Mexico, have recently been enlarged and improved.

John Nazaley, of Wright Aeronautical Corp., has been conducting a series of lectures at Emilio Carranza School of civil aviation, Mexico City.

Sir Henry Segrave has accepted the post of technical advisor to a group of English business men who are forming a new aviation company. It is said that $5,000,000 has been made available for experiment, building a factory, materials, etc.

A special study of instruments used in determining altitude records is to be made under the auspices of the F.A.I. The committee has accepted a proposal to license three grades of glider pilots, and it will be submitted at the next meeting.

A Rohrbach Romar flying boat which sank during trials was raised after being submerged for several days, and found to be very little damaged. The metal showed no evidence of corrosion, and tests indicated no weakening of the material.

M. Laurent Eynac, French Air Minister, made a vigorous reply to Socialist attacks recently made in the Chamber of Deputies, charging among other things that he overemphasized military aviation.

All of the 150 pilots employed by Deutsche Luft Hansa are now taking thorough training in blind flying.

Covering 2,043 mi. in 18 hr. 1 min. 20 sec., carrying a load of one ton in their Breguet sesquiplane, Dieudonne Costes and Jacques Codos broke the world's records for distance and duration for this category.

Proceeds from the first month of operation of air mail service in Guatemala were $4,719.75, of which $1,817.18 was paid to Pan American Airways, Inc.

The Vicomte and Vicomtesse de Sibour are planning an extended tour of Egypt and Algiers in a De Havilland Moth. Mm. Loti, Lefevre and Rabattel are planning a long trip toward Abyssinia in a Farman cabin plane with Hispano-Suiza 250 hp. engine. M. Vavasseur de Precourt, winner at La Baule Rallye last year, is expecting to fly to central Africa with his wife.

Unofficial figures for value of goods handled at Le Bourget airport in 1929 are 3,483,271,350 francs ($135,847,600) for imports and 340,182,000 francs ($13,267,100) for export.

SPRING — SUMMER — SEAPLANES

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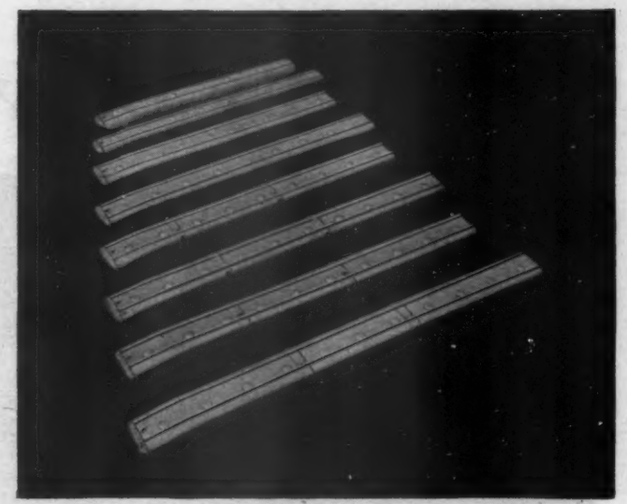
FLOATS ARE READY NOW!



8 of the 11 standardized models

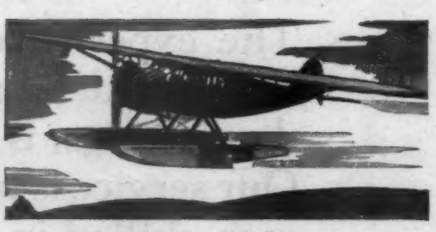
EDO greets the greatest seaplane year with the largest and most complete stock of floats in EDO history.

With the spring season so near at hand, airplane manufacturers, distributors and transport operators are turning their attention to the additional sales and greater range of service which EDO Floats make possible. In view of the tremendous and growing demand for floats, the advantages of this preparedness are obvious.

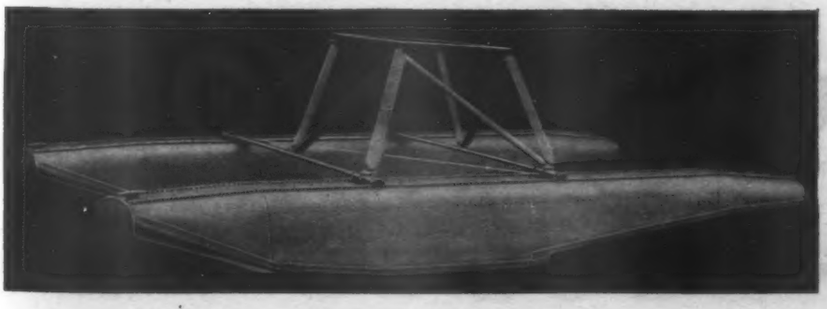
Standardized in 11 models for the conversion of more than 40 distinct types of landplanes up to 8,250 lbs. gross weight, EDO Floats fully comply with U. S. Department of Commerce regulations. They can be quickly interchanged with standard types of wheel landing gear. The close cooperation between EDO designers and the engineering staffs of most airplane manufacturers assures correct and efficient design with the added durability of EDO craftsmanship.

Other manufacturers who seek a wider sales outlet for their aircraft are invited to make use of EDO experience and ability—to build profits through the EDO Sales Plan which assures complete protection. There is still ample time to enter the 1930 market with a float installation designed by EDO particularly for your machine.

NOW is the time to place an order for the 1930 season, for even your estimated maximum requirement may fall far short of actual demands. Delays of peak season production are avoided and 'ready-to-install' is a sales point that will surely put profits at your command. For information address EDO AIRCRAFT CORPORATION, 600 Second Street, College Point, L. I., N. Y.



A typical EDO Float installation —quickly interchangeable with wheel landing gear



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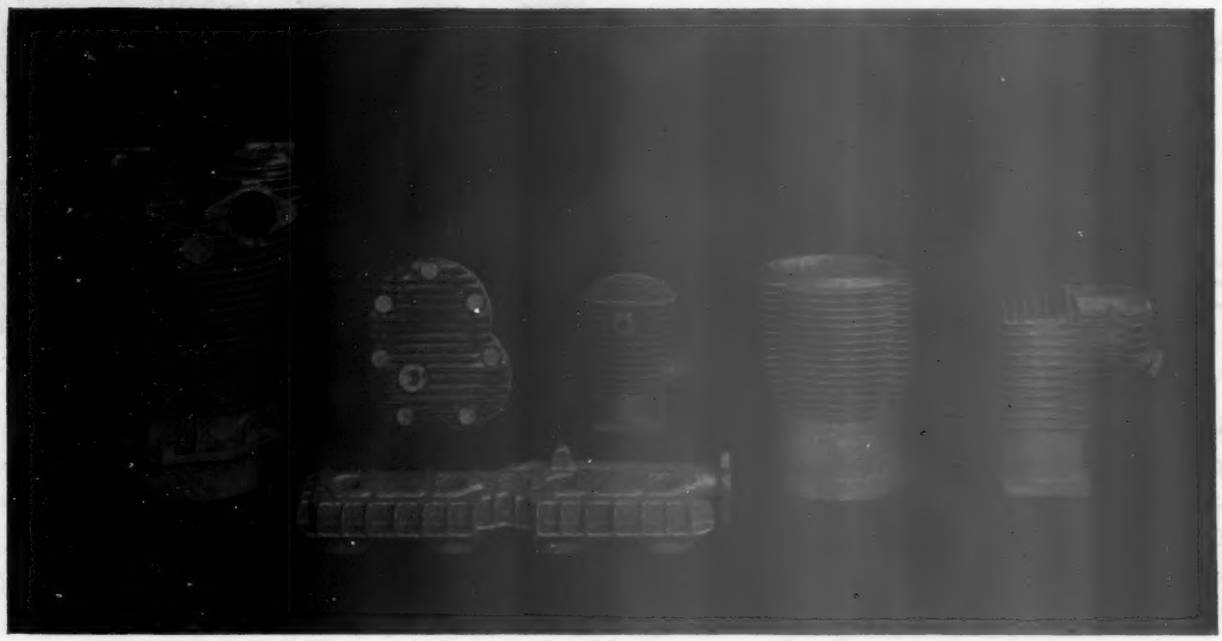

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Oil, 8 gals	60 lbs.
Pilot	170 lbs.
5 passengers and baggage	1,150 lbs.
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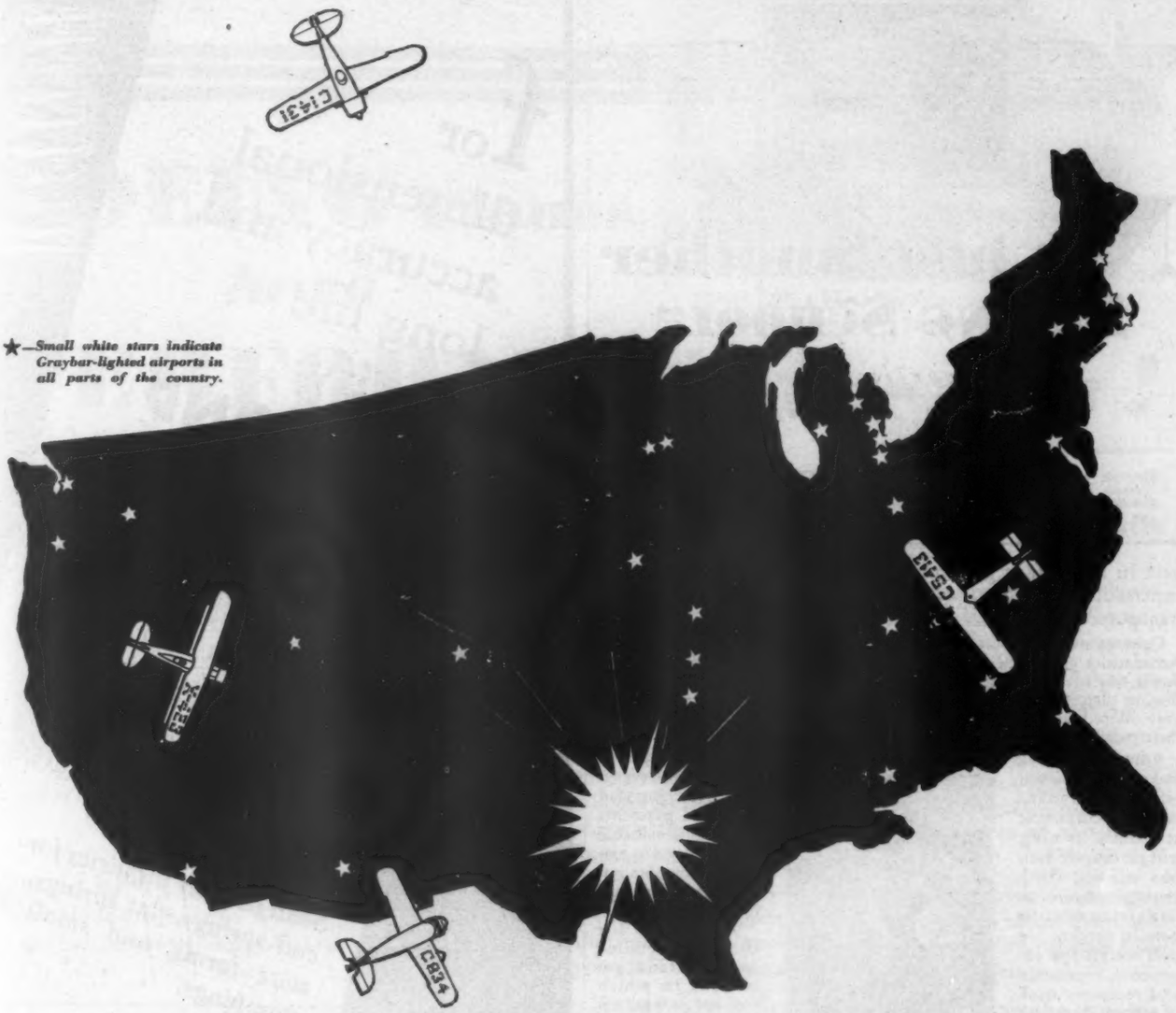

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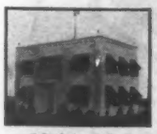

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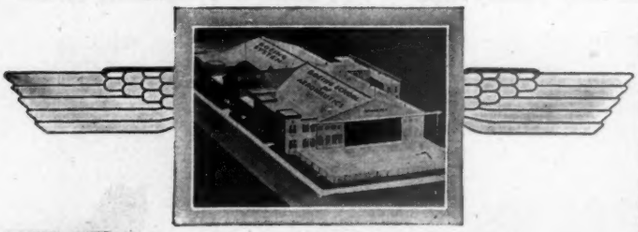

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Courses ***now given*** at Boeing's new Oakland California School of Aeronautics are based on practical knowledge and experience. Facts flown out of the seven million miles that Boeing pilots have flown Boeing planes, form the basis of courses far more comprehensive than ever offered before—taught by men who are admittedly leaders in their particular fields of aeronautics.

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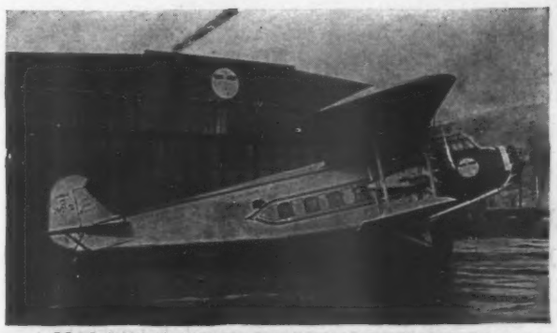

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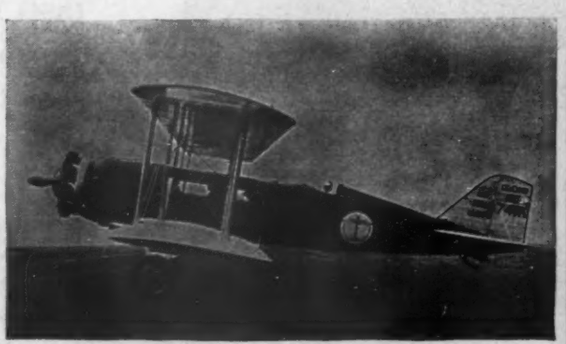

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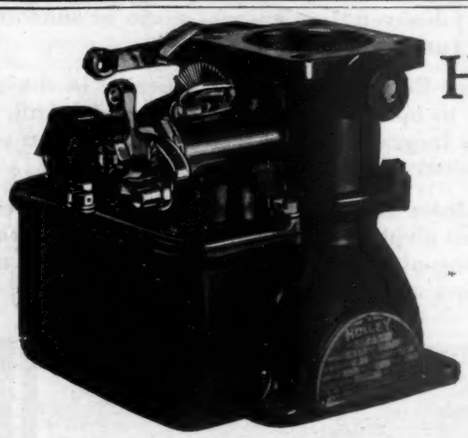

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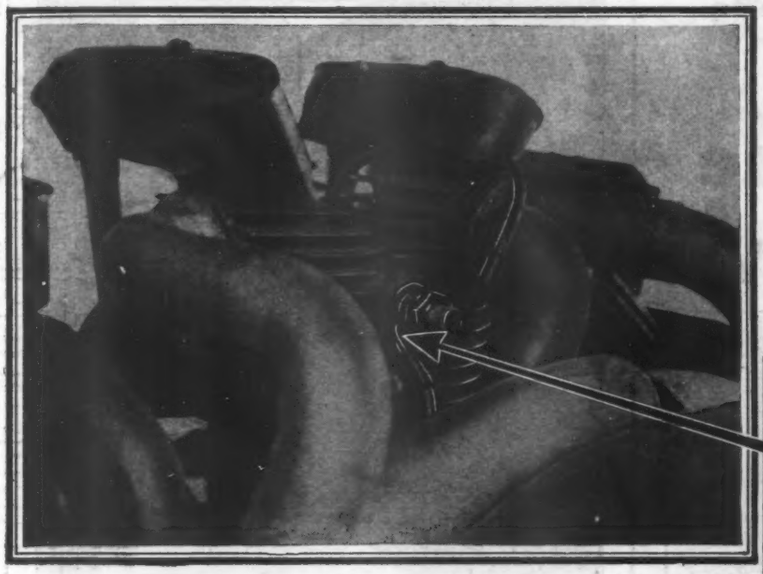
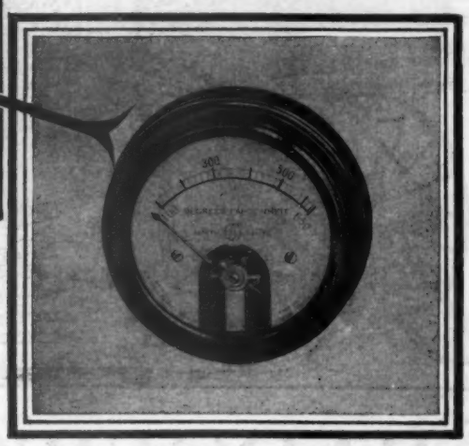


. . . . Read your engine temperature *DIRECT*



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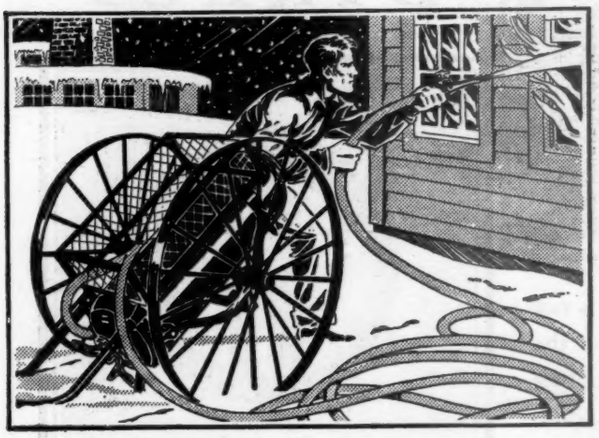

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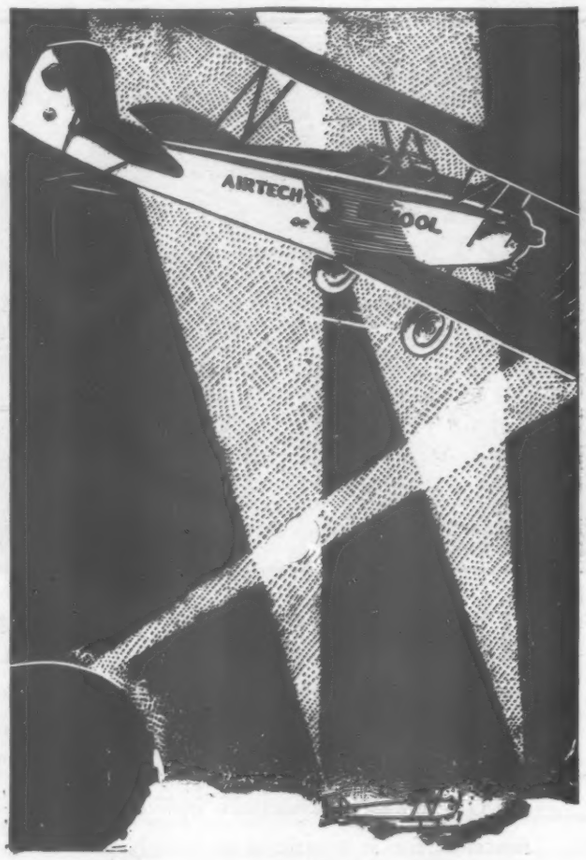

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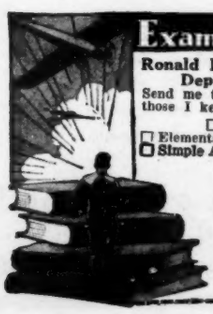

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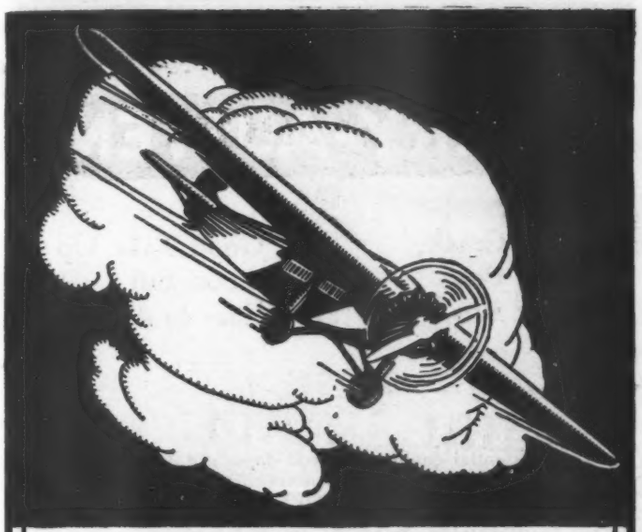

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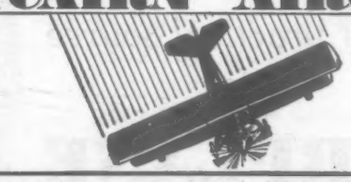

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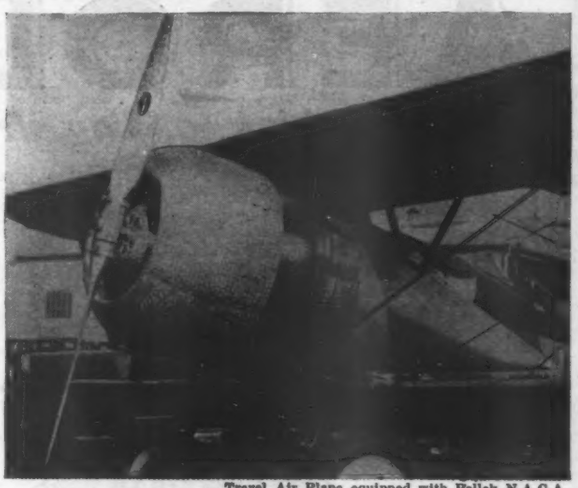

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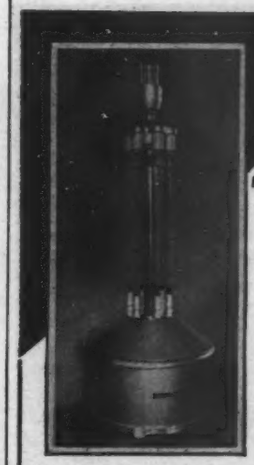

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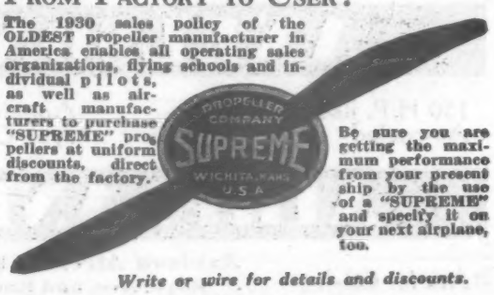

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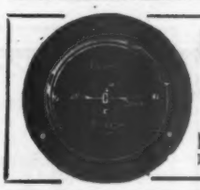

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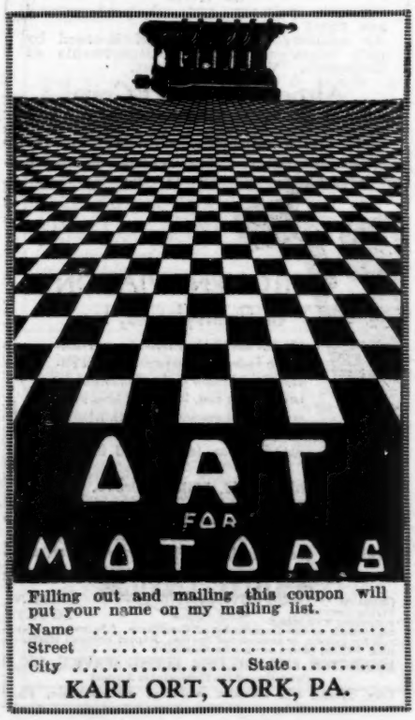

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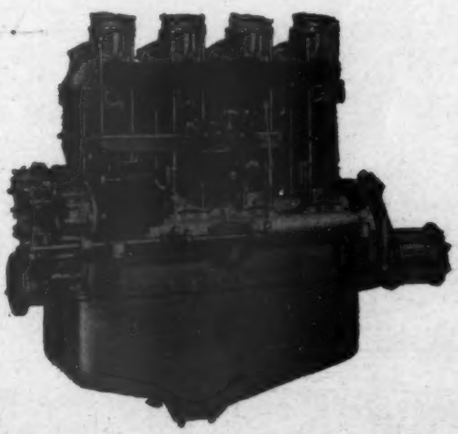

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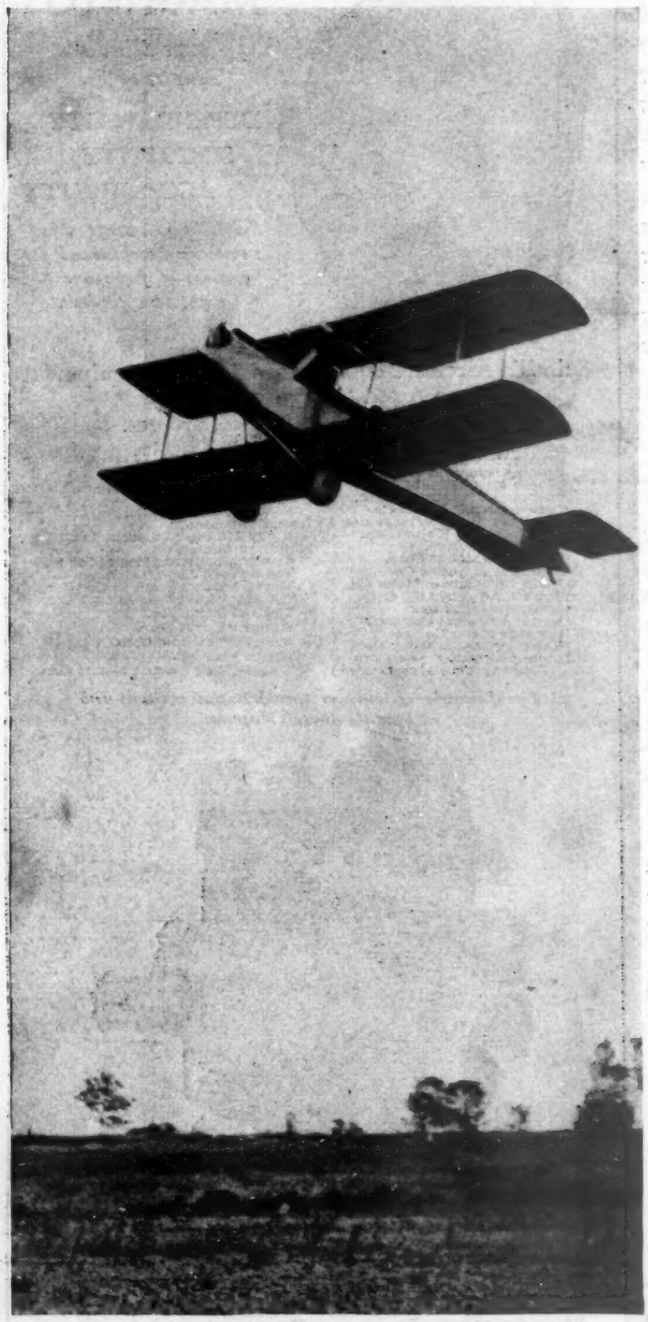

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